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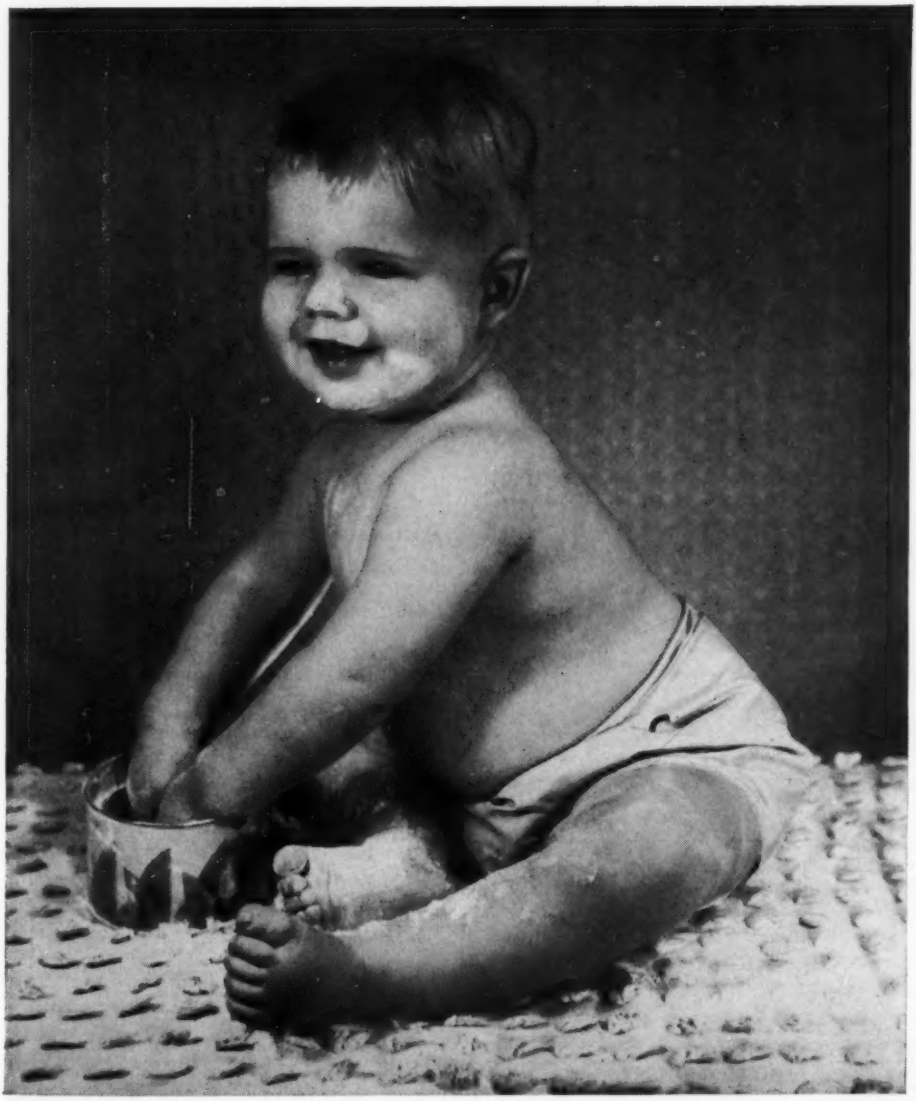

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VOLUME XXXIV NO. 1

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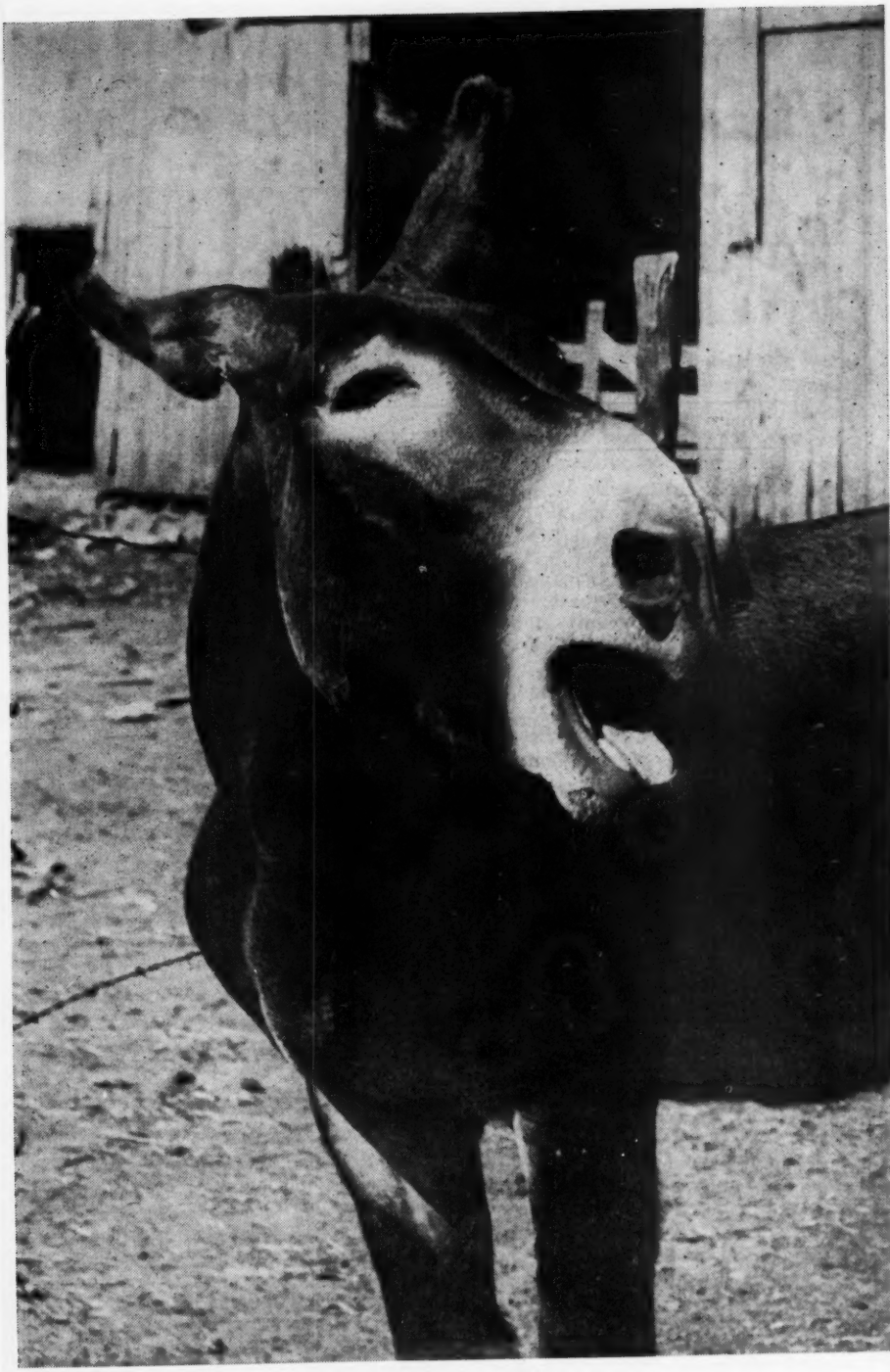

Lament!

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VOL. XXXIV WASHINGTON, D. C., JANUARY 1950 No. 1

Halfway Thru . . .

The Old Century

Jeff McDermid

ALTHOUGH 1950 is the half-way year of the good old Twentieth Century, most of the inhabitants of the world were born in these last 50 years since Father Time pushed the Nineteenth Century and its rousing Victorian era aside to make room for all the frightful and fruitful things which five decades have brought us. It therefore devolves upon a scant percentage of us living mortals to draw upon living but imperfect memories to reinforce library references respecting the marvels and movements before and since the present middle-aged century opened.

During the passing away of 50 years we have gone from the steel age to the power age and through that to the electric age and the atomic age, which now confronts us. All this and more has happened to us without changing some of the elemental and primary things of life—like the need to eat when you're hungry, to rest when you're weary, and to depend on good friends and faithful companions when you're lonely and bereft.

And it hasn't changed one iota the other processes, such as birth and marriage and death—and taxes. Also, I regret to report, it finds us very little further along in securing a peaceful and brotherly universe, with just a few noteworthy and encouraging exceptions.

In our neighborhood in 1900 and 1901 we had at least two rather irrelevant and immaterial topics to take up our spare time around the parlor heater or at country-store opinion forums.

They were not so important for human welfare but they attracted attention far beyond their merit and caused old friends to break company and relatives to squabble.

FOREMOST was the debate arising over the exact January 1 when the new century was to be born and celebrated. Some hailed January 1, 1900, as the natal day, and perhaps a larger crowd poo-poohed that idea and fixed their welcome programs for January 1, 1901. Arguments would arise high over digits from 1 to 10 in efforts to simplify the problem, some saying that when you counted 10 that was 10, while others said that 10 was not fully accounted for until you got to 11. A few insisted that the 12 months between 1900 and 1901 were a sort of threshold period and belonged to neither the fresh nor the stale century, being just a transition; and that the real opening of the Twentieth Century had to wait until 1901 appeared. I expect you folks who live to bring in the Twenty-first Century will be apt to start all that useless battling over again.

Now the other question was whether to uphold or condemn the suggestion made by Vice-President Theodore Roosevelt to remove from our coins the motto, In God We Trust. It raged all that Winter, as near as I can remember, with some voicing the opinion that the base use to which money is put is an insult to the Creator, and the others adhering to the patriotic stand that America must never refuse to acknowledge Heaven's help and succor.

I recall that our home-folks stood as a unit on the 1900 entry date for the new century, and we also stood pat on keeping the theological motto on our money.

Father went to bed early on the night of December 31, 1899, and "Ma" and I ushered in the Twentieth Century together by the old sitting-room stove. We laid aside our card game of "authors" and she postponed darning my socks, so that we might clasp hands and welcome the fateful dawn of a New Era in proper style. The rest of the family were in other locations. When the whistles stopped and the church bells finished their clamor, Ma and I went to the kitchen and sampled some of the sweet cider and doughnuts.

She had been born about 50 years before, in just about the same spot in the past century that we now find ourselves occupying in this one. But she and her folks were of the original pioneers and broke the first trails and plowed the first furrows—all of which shows us how very youthful our country really is.

In the midst of old-time reflections like these—which usually do not inspire young folks very much—it's my privilege to point out that Ma and Pa and the rest of the elders back there did not try to advise us kids about all details for the future, even at such a momentous milestone as 1900. They didn't do it because they realized, as we do now, that young folks seldom take advice in any form, sugar-coated or bitter.

IN the long run I guess it's just as well they don't. Nobody alive can sense the future's forces and conditions enough to chart a course for a new life or be sure that decisions facing young people can be made entirely on the experience of the past. Sure, we can point out shoals or rapids and sharks, but all the steering and navigating is going to be handled by the person who wants to be captain of his own soul, the master of his own destiny.

In this I refer more to negative advice than positive truths. So that squares with our own experience, wherein many young leaders and discoverers paid no heed to elderly warnings that "nothing like that ever worked and never will—don't waste your time on it." If they had taken that sage philosophy to heart, we would be minus many of the achievements and facilities of this modern age.

Changes that time has wrought in the course of the present century, all within a span of 50 years, have altered

many of the physical and material possessions and conveniences on the farm and in the home. It cannot be said that all of the credit for these advances belongs to the workers and inventors in this century, however, because the need was there and the seed was sown and the first steps were taken in the last 50 years of the century preceding this one.

In any consideration of so vast a theme and so revolutionary a period of change, it's interesting to get the opinion of one of the daring pioneers whose name will forever be linked with youth and its classic achievements. Colonel Charles Lindbergh, whose great flight alone across the Atlantic in May 1927 held millions breathless for 30 hours, has only recently pointed out in a talk on the ocasion of the Wright Brothers anniversary that we are now too much insulated by mechanics and luxuries from the basic experiences that make men spiritually great. He insists that we stand in need of more fundamental things than those science has supplied to save us from exertion and to save time. In other words, he thinks that we can be so hemmed in and circumscribed by gadgets that we lose sight of things more worth while for the soul's peace and welfare.

Much as we fret and argue over the implications of what has sometimes been called "the welfare state" we cannot but applaud countless changes which this century has seen in the lifting of many burdens and unfair conditions, together with the passage of many wise laws and voluntary customs of a high social value.

After all, I am sure that many of the best movements for relief and fair play among our citizens have come about through education and voluntary efforts, rather than from being imposed by any regimented system. One need only scan the commercial and industrial field to sense the great betterment in working conditions and retirement and sick benefits that have made dark spots brighter and more humane in the past five decades. Even with our material achievements which have boosted us forward in 50 years to a greater length than man could boast of in any previous 50 centuries, our hearts yet beat warmly and our sympathies and our sense of justice are fully awake and responsive.

Balanced achievement in a wide field of endeavor has been encouraged by many notable means, none of the least of which has been the Nobel annual award. It was in 1901 that the Swedish Academy of Science announced the first Alfred Nobel prizes, including awards to Wilhelm K. Röntgen for discovery of X-rays in 1895, to J. H. van't Hoff for work in chemical thermo-dynamics, and to E. A. von Behring for his antitoxin against diphtheria. Three other mighty discoveries which were made in the last four years of the Nineteenth century got later recognitions by the Nobel committee. These were to Max Planck for his revolutionary quantum theory, Pierre and Marie Curie for radium, and to J. J. Thompson and Henry Becquerel for discovery of the electron and radioactivity. In all, since this great incentive to progress has been in effect, there have been 124 prizes in

(*Turn to page* 49)

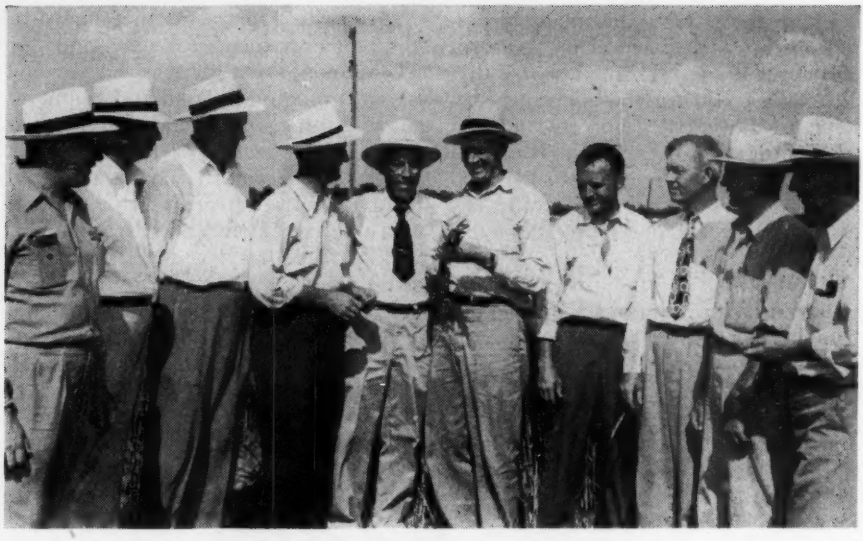


Fig. 1. Plant breeders attending first annual soft red winter wheat field day in Indiana at Schenk Farms, R. 5 Vincennes, Indiana, in 1947. Left to right: Dr. C. A. Lamb, Ohio State University; Dr. Wayne Bever, U. S. D. A.; Dr. John Washko, Penn State College; Dr. L. M. Josephson, University of Kenutcky; H. R. Lathrope, Purdue University, in charge of the field day; Charles Schenk, farmer cooperator; Dr. David Reid, University of Kentucky; Dr. O. T. Bonnett, University of Illinois; L. E. Compton, U. S. D. A.; and Dr. B. B. Bayles, U. S. D. A.

Wheat Improvement in Southwestern Indiana

By H. R. Lathrope

Extension Agronomist, Purdue University, Lafayette, Indiana

THE Southwestern Indiana Wheat Improvement Program is a demonstration in adult education. Eight counties, known as the "Pocket Area," are involved. More than 3,000 wheat producers have been growing soft red winter wheat in this area, primarily for cake and pastry flours, for nearly 100 years. The "campus" of Purdue University has been enlarged to include an intensive educational program in the Pocket Area.

The improvement of soft red winter wheat in southwestern Indiana (Pocket Area) was undertaken in 1930 by Purdue University in cooperation with Igleheart Brothers, Inc., Evansville, Indiana, which has been the sole and continuous sponsor for the past 19 years. The initial program was formulated by the "Three Johns," namely, John Hull, county agent, 1928-1940, Vanderburgh County; the late Dean John Skinner of Purdue; and the late John Igleheart of Igleheart Brothers. A directive and memorandum of understanding were signed May 24, 1930, by Purdue's president E. C. Elliott, Dean Skinner, A. T. Wiancko, and Mr. Igleheart. The memorandum

stipulated for: (1) Surveys of the wheat situation in the eight counties later called the Pocket Area; (2) tests and demonstrations on varieties, and on fertilization and rotation practices; (3) demonstrations on control of smuts, other diseases, wild garlic, and weeds; (4) location of desirable sources of seed wheat and aid in their production and distribution; and (5) promotion of improved production practices, discovered by research and farm experience.

The Pocket Area is well adapted, with respect to soils, climate, and farm "know-how," to the production of soft red winter wheat suitable for the manufacture of the finest pastry flours. The program involves participation by about 3,000 producers who grow wheat annually on nearly a quarter of a million acres. These producers operate a total of approximately one million acres of which about 45 per cent is devoted to corn, 22 per cent to wheat, 21 per cent to soybeans, three per cent to oats, and ten per cent to hay and legumes. Only about three per cent of the land devoted to legumes is producing alfalfa or sweet clover. Producers have followed a cash-crop system of agriculture. Livestock consists mainly of hogs.

Average Yield Increased

In 1930 the average annual yield of wheat in the eight counties was 14.1 bushels per acre. After the improvement program had been operating for nine years, the yield had increased to 17.4 bushels per acre while the average annual yield in eight nearby counties having no intensive program was still 14.0 bushels per acre. If valued at $1 per bushel, this 3.3 bushel per acre increase on the 200,000 acres represents an added annual income since 1939 of more than $600,000 to the 3,000 producers.

Vigo, the first disease-resistant soft red winter wheat released from Purdue, was distributed to 12 producers in 20-bushel lots in the fall of 1946. Vigo, seeded on good soil and fertilized well, yielded double the average of the old varieties. More than 8,000 bushels of this new variety were seeded in the area in the fall of 1948. Because of its stiff straw and its resistance to loose smut and leaf rust, Vigo won the admiration of wheat producers, and more than 100,000 bushels of Vigo seed wheat were produced in 1948. It has been estimated that one-third of the entire area was seeded to Vigo in 1948. In 1949 Vigo was judged the best variety in each of the eight counties by 320 local judges who selected the best fields for the 10-acre contest. Vigo possesses high-yielding ability as well as eye-appeal.

Twenty-eight wheat producers were consulted in 1946 concerning the program for improvement. The following was adopted subject to revision at each annual planning conference:

1. Sow only seed which has been cleaned and treated for stinking smut, (bunt).
2. Sow only approved soft winter wheat varieties, which include Vigo,

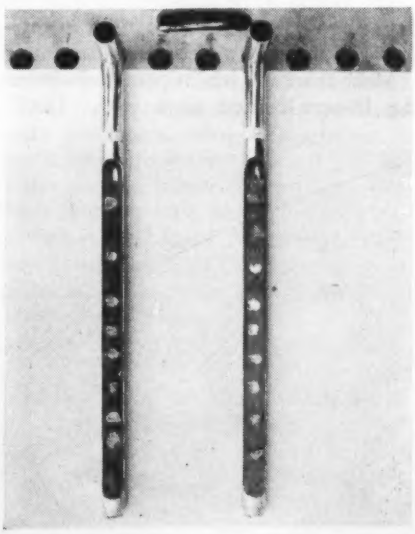


Fig. 2. These soil-testing tubes (Hoffer's underground periscopes) are very useful in examining the soil tilth and aeration. The fine texture of the soil on the left is much more valuable to the owner than the tightly compacted soil on the right. Deep-tap-rooted legumes, such as sweet clover and alfalfa, are perhaps the best known methods of correcting the condition caused by continuous plowing and use of heavy equipment —tractors, corn pickers, lime spreaders, and combines.

Royal, Goens, Rudy, Fultz, Thorne, and Butler.

3. Sow on fields free from garlic, cockle, and cheat.

4. Correct soil acidity and follow a good rotation including deep-tap-rooted legumes.

5. Sow after fly-free date.

6. Fertilize with 400 to 500 pounds of 3-12-12 per acre or its equivalent. If in doubt concerning soil needs, submit soil samples to county extension agent.

7. Apply 80 to 125 pounds of nitrate material (20 to 25 pounds of nitrogen) per acre about March 1 as a top-dressing on light-colored soils or those low in organic matter.

8. Combine wheat only when moisture content is 14 per cent or less.

9. Store wheat in bins which have been thoroughly cleaned and sprayed with a five per cent solution of DDT.

10. Feed or destroy small lots of wheat. Never store new wheat with old wheat.

11. Wheat to be stored more than 30 days should be fumigated with an approved fumigant.

More than 350 wheat producers enter the 10-acre contest each year. Local committees select the championship field in each county, and three judges selected at Purdue visit all the championship fields, scoring each on uniformity, diseases, weeds and crop mixtures, soil management and culture. After the fields are scored for appearance, four samples are cut by each of the three judges in four places in each field—a sample being cut with a hand sickle from a section 30 inches wide and across one drill row. The wheat is later sacked, tagged, and threshed. Yields are computed for each field. During the past three years, nine different judges have used this method and have arrived very accurately at the yield of each field. Cutting 16 samples from each of the fields adds to the work but promotes stability and accuracy.

The wheat improvement work in southwestern Indiana is a demonstration in adult education. Sponsored by an industrialist for the betterment of all the people in the community, it is a brilliant example of cooperation among industry, research, and farm folks. Local people, when asked to place first things first among a list of six major problems ranked them as follows: (1) Fertilization, including lime, in addi-

Fig. 3. Joe Youcum, Vincennes, believes in applying nitrogen to his wheat fields around the first of March each year. Mr. Youcum is showing the drillability of the material which is applied at the rate of 20-25 lbs. of N. per acre.

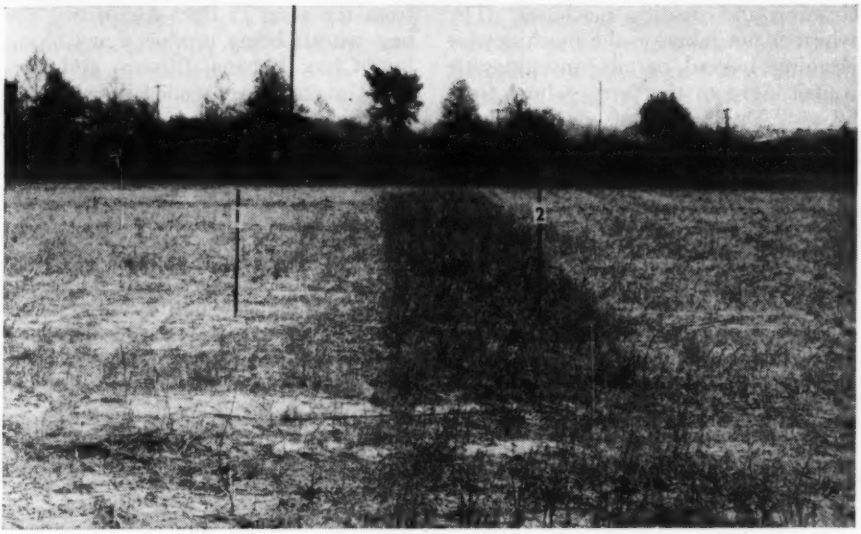


Fig. 4. Check plot #2 in a field taken over by wild garlic. The balance of the field was sprayed with 2 lbs. 2,4-D, Amine, April 1, 1948; picture taken three weeks after spraying. Equipment furnished by Ken Standard Corporation, Evansville, Indiana, was a spray boom attached to a jeep.

tion to phosphate, potash, and nitrogen; (2) soil tilth and soil structure; (3) better varieties; (4) garlic control; (5) cleaning and treating of seed; and (6) control of stored-grain insects.

Soils in the Pocket Area are low in organic matter, phosphorus, and potash; many are strongly acid. Much of the soil in the area lacks good tilth and structure, suffers from lack of aeration, and has low water-holding capacity. Plow-sole hardpans prevent good vertical drainage and root penetration. Much evidence has been found to indicate that magnesium, manganese, and boron also are lacking. Getting good catches of legumes has been a problem for years. In 1949, however, producers secured good catches of legumes, including ladino, alfalfa, sweet clover, and red clover in high-yielding fields where 100 pounds of A.N.L. carrying 20.5 per cent N had been applied as a topdressing and where 50 to 60 pounds of P and K had been applied at seeding time.

Harold Pirtle of Sullivan County, winner of the area 10-acre contest, using 100 pounds A.N.L., secured an excellent stand of wheat, yielding 57 bushels per acre, and an excellent stand of legumes. Seven of the eight contestants in the county championship contest secured good stands of legumes and each used at least 400 pounds of 3-12-12 or its equivalent. In previous years producers using nitrogen as a topdressing sometimes blamed the nitrogen for the failure of legumes. But Herb Johnson with his 46-bushel yield of Vigo in 1947 and Carl Batteiger with his 45-bushel-yield in 1948 secured good stands of legumes on well-limed soils, using 20 to 25 pounds of N per acre as a topdressing and 400 to 500 pounds of complete fertilizer at seeding. Legumes such as alfalfa and sweet clover, topflight soilbuilders, are the lubricants in the soil production program. Charles Schenk, president of the Southwestern Indiana Wheat Improvement program, says: "We have to stop our machines for oil and grease, and I believe that it pays to stop production long enough to grow a deep-taprooted legume. Soil-improvement crops are necessary if we expect to continue to produce high yields."

Stinking smut has been kept out of the Pocket Area by the use of seed

cleaning and treating machines. The wheat is not taken to the machines for cleaning; instead, portable machines are routed right to the farm, where from 50 to 2,000 bushels of seed per farm are cleaned and treated at the rate of 100 bushels per hour. Producers recover the cost of the entire cleaning and treating through the salvaged screenings—the cracked, broken, and damaged wheat which possesses only low germination value and which, if planted, would rot and decay in the soil. At the same time as the wheat is cleaned, it is treated for "bunt" or stinking smut with Ceresan M. County agents and county wheat committees route the machines and solicit producers who desire to have their wheat cleaned and treated. The Pocket Area is rapidly becoming an excellent source of high-yielding seed, free from smut and from cockle and other weeds. The portable cleaners are owned privately as well as by cooperative groups. More soft red winter seed wheat is cleaned and treated annually in the Pocket Area than in any other place in the Midwest.

In order to secure the best wheats from the area, 25 lines comprising the best wheats being produced at Columbus, Ohio; Urbana, Illinois; and Purdue University are seeded in replicated plots in each of the eight counties. Eight hundred plots were seeded in 1948. Last season all plots were harvested and threshed and yields were computed by July 15.

In addition, 156 drill-width plots, about 1/40th of an acre in size, were seeded at the Schenk farm. On this farm 30 wheats were seeded in four replications. A vacuum sweeper was used to clean the grain drill after the seeding of each plot, enabling the entire test area to be seeded in one day. Wheats were seeded on high- and low-fertility levels. All the high-fertility plots received 480 pounds of 3-12-12 at seeding time and were topdressed with 100 pounds of A.N.L. on March 1. On July 4 the entire layout, consisting of 156 drill-width rows, was combined with a push type machine. (See Table I.) The short early ripening wheats, which have captured the eye of every wheat grower and miller in the area, again outyielded all others.

Nowhere else in the Nation have

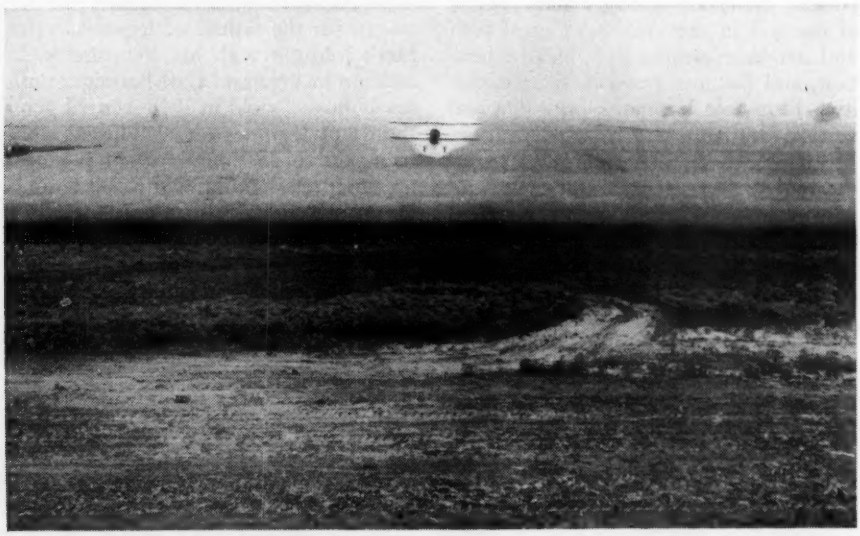


Fig. 5. Twenty pounds of dusting sulfur per acre were applied for the control of black stem rust. The applications were made in the early morning when the air was still and there was dew or moisture on the wheat. The sulfur remained until harvest time in areas where no heavy rains fell.

the most promising wheats of three great plant-breeding stations been tested under farm conditions in such large numbers. The old-fashioned wheats of yesteryear are far outclassed by the new "college-bred shorties," strains which possess winter hardiness, stiff straw, earliness, and yielding ability. Farm folks appreciate the opportunity to inspect these new wheats before they are released. Cooperators on whose farms they are grown enjoy the opportunity of seeing the new wheats first. Such cooperators respect their obligation and privilege to work with a great university in a modern wheat improvement program. These new wheats are as safe in the hands of the nine cooperators as they would be on any experiment station in the country.

Because soils in the area are lacking in nitrogen and organic matter, 1,000 tons of A.N.L. were secured for a test-demonstration program. Each producer was allotted one-half ton. Few men in the area had used nitrogen

TABLE I. WHEAT YIELDS—SCHENK PLOTS—KNOX COUNTY—1949

Variety	Fert. av. bu. per A.	Unfert. av. bu. per A.	Increased yield bu.	Profit from fertilized section after deducting growing and harvesting cost of $38 per acre. Wheat at $2.	Ht. inches 1st. rep.		Rank
					Fert.	Unfert.	
Royal	51.8	39.2	12.8	$65.60	45	40	13
Butler	50.1	37.7	12.4	62.20	46	42	17
Vigo	49.7	41.1	8.8	61.40	48	42	18
Thorne	48.6	38.3	10.3	59.20	45	41	19
Prairie	44.7	32.6	12.1	51.40	48	41	22
Goens	44.5	33.6	10.9	51.00	46	45	23
Rudy	42.6	31.9	10.7	47.20	46	39	24
Fairfield	41.8	30.9	10.9	45.60	46	44	25
Fultz*	40.2	30.2	10.0	42.40	45	39	26
Experimental							
414A9–2–3	65.0	51.9	13.1	98.00	44	38	1
414A29–4–1**	62.0	51.9	10.1	86.00	44	36	2
414A16–3–1–2	59.2	44.7	14.5	80.40	42	35	3
CI12557	56.2	44.4	11.8	74.40	47	38	4
C250	55.1	36.0	19.1	72.20	50	43	5
43–254	53.9	36.3	17.6	69.80	49	45	6
CI12651	53.7	44.6	9.1	69.40	46	36	7
CI12457	53.7	40.8	12.9	69.40	44	38	7
41–679	53.0	41.0	12.0	68.00	48	40	9
T. N. 1016–4	52.8	34.7	18.1	67.60	48	41	10
B40149A4–9–3–2	52.1	40.6	11.5	66.20	40	35	11
CI12650	52.0	40.6	11.4	66.00	47	36	12
CI12530	51.8	41.7	10.1	65.60	45	36	13
CI12400	51.8	41.7	10.1	65.60	47	39	13
C180	50.6	42.6	8.0	63.20	48	43	16
C247	47.0	37.6	9.4	56.00	50	46	20
C248	44.9	34.5	10.5	51.80	50	43	21
C263	38.8	32.1	6.7	39.60	52	45	27
C179	49.7	40.0	.....	.....	.....	.....	.....
45–501	.....	45.6	.....	.....	.....	.....	.....
45–553	.....	42.8	.....	.....	.....	.....	.....

*4 Replications
**2 Replications
Average number of bushels from fertilized plots, 50.7 bu. per A.
Average number of bushels from unfertilized plots, 39.0 bu. per A.
Average increased yield, 11.7 bu. per A.

Fig. 6. Harold Pirtle combined his championship wheat field on July 4, 1949; the yield was 57¼ bu. The contest drew 350 entrants from the eight counties in the Pocket Area.

material previously for topdressing wheat. Nearly 2,000 men called for and paid cash for 1,000 pounds of this "gunpowder" nitrogen material and applied it early in March. The 1,000 tons were enough to topdress only about 20,000 acres, or 10 per cent of the total wheat acreage. Those using the material applied it to their best acres where 300 to 500 pounds of 3-12-12 had been used at seeding. The average increased yield reported was about seven bushels per acre.

The 1,000 tons cost producers about $60,000 but increased the yield more

(*Turn to page* 41)

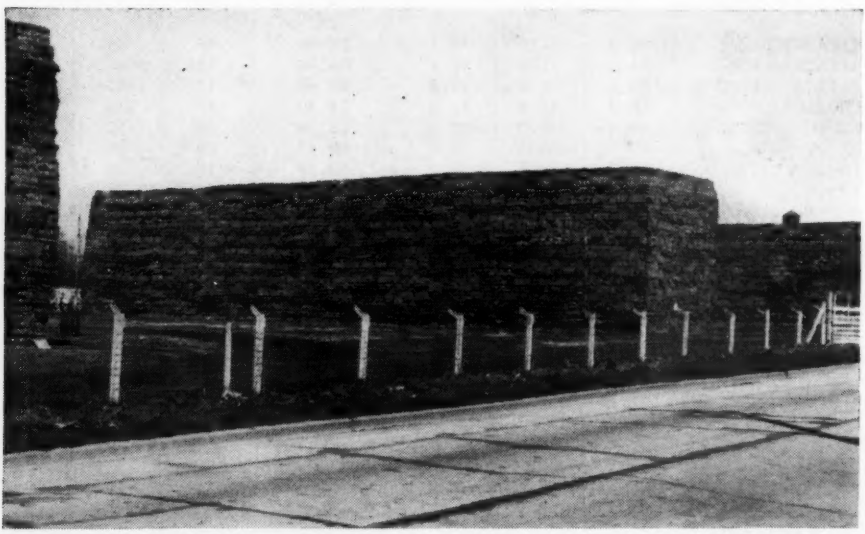


Fig. 7. This 400-ton rick of wheat straw taken from about 400 acres contains approximately 4,000 lbs. of nitrogen, 1,500 lbs. of phosphorus, and 6,000 lbs. of potash—equivalent to about 400 bags (100 lbs. each) of a fertilizer grade of about 10-3-15. When a farmer sells his wheat straw he should return the equivalent minerals in fertilizer.

More Corn from Fewer Acres

By Murry C. McJunkin

Coke Oven Ammonia Research Bureau, Columbus, Ohio

IN the late 30's before hybrids were generally grown in Pennsylvania, total annual production of corn was around 40 million bushels. Last year's crop was approximately 65 million bushels from about the same acreage. All of this increase can not be attributed to hybrid seed, nor can it be assumed that a limit in production has been reached. The concensus of the Pennsylvania Station Corn Team[1] is that 85 million-bushel annual crops for the State are entirely possible with no increase in acreages if present scientific knowledge is put to work.

In the June-July, 1949, issue of BETTER CROPS WITH PLANT FOOD, L. L. Huber, leader of the Corn Team, explained how "Heredity Plus Environment Equals a Corn Crop." Presumably an adapted corn hybrid has good heredity as far as the area in which it is to be grown is concerned, thus satisfying one of the factors in this equation. Environment, the other factor, includes seasonal temperatures, rainfall, soil type, soil fertility, and the associated features of any agronomic area. Environment not only exerts a major influence on yields but maintains rigid control over how strongly heredity is expressed.

Farmers can do nothing about the weather and very little about the various soil types which appear in their fields. However, the productivity level and moisture-holding capacity of a field may be improved through the growth of legumes, incorporation of barnyard manure and plant residues into the soil, and the liberal application of mineral fertilizers. This appears to be the key to further increases in corn yields.

Records taken by vo-ag students and veterans in training during 1947 and 1948 substantiate the predictions of the Corn Team. This was, as far as the writer knows, the first time that an attempt has been made to translate research findings in corn growing with little or no modification directly into farm practice.

In the 1947 trials, 186 vo-ag boys and veterans grew 2-acre test plots of corn in 27 counties of the State. The trials covered a wide variety of conditions; frost-free periods ranged from 125 to more than 200 days with com-

Fig. 1. Amos Pyle, Mercer county, produced the most grain per acre each year by following research practices.

[1] The members of the Pennsylvania Station Corn Team: L. L. Huber and B. L. Seem, corn breeders; J. E. Steckel, soils technologist; S. M. Raleigh, chemical weed control; C. C. Wernham, plant pathologist; B. F. Coon, entomologist; R. C. Miller, agricultural and biological chemist; and A. W. Clyde and R. E. Patterson, agricultural engineers. In 1947 and 1948 the writer was associated with this group in supervising the trials reported in this article.

parable variations in soil types and rainfall. The average yield of corn per acre for those who completed their records sufficiently well for analysis was 77 bushels in comparison with 66 for check plots on home farms and a 45-bushel State average.

In 1948, a total of 386 vo-ags and veteran trainees, including many who also engaged in the 1947 trials, grew corn in accordance with suggestions outlined by the Station Corn Team. The average yield of corn for those who completed their records was 97 bushels per acre. The average for the check plots was 87 bushels and for the State, 46.

Amos Pyle, Mercer county, grew the highest yielding plots both years. The first season his 2-acre plot averaged 164 bushels and the second year 170 bushels of shelled corn per acre.

Before engaging in these tests, few of the boys had made pre-planting applications of mineral fertilizer for corn. Most of them were accustomed only to the use of moderate applications with the planter. Insofar as was possible, 10-10-10 fertilizer was used in all trials both years.

In general, analyses of the data showed that those who followed the recommendations of the Corn Team closely attained the best results. Those young farmers who made pre-planting applications of 200 pounds of mineral fertilizer per acre in addition to regular fertilizing practices averaged more than eight bushels per acre gain in yield; those who made pre-planting applications of 400 pounds per acre averaged more than 11 bushels gain; and those who made pre-planting applications of 500 pounds per acre averaged slightly less than 10 bushels per acre gain in yield. Increases dropped off rapidly where greater pre-planting applications of mineral fertilizer than these were made. Best yields in general followed legume sods topdressed with manure, in addition to mineral fertilizer applied both before planting and with the planter.

The suggestions offered by the Corn Team and used by the students in conducting these trials are condensed here. The more important were:

A. A list of open-formula hybrids approved for each of the five adaptation areas of the State.

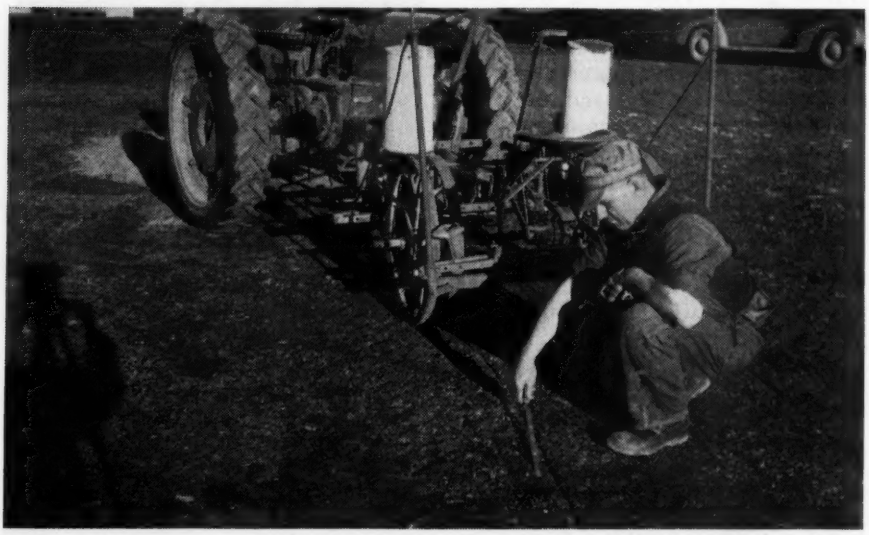


Fig. 2. After the planting rate was calculated, the vo-ag and veterans found careful adjustment of the planter a prime necessity.

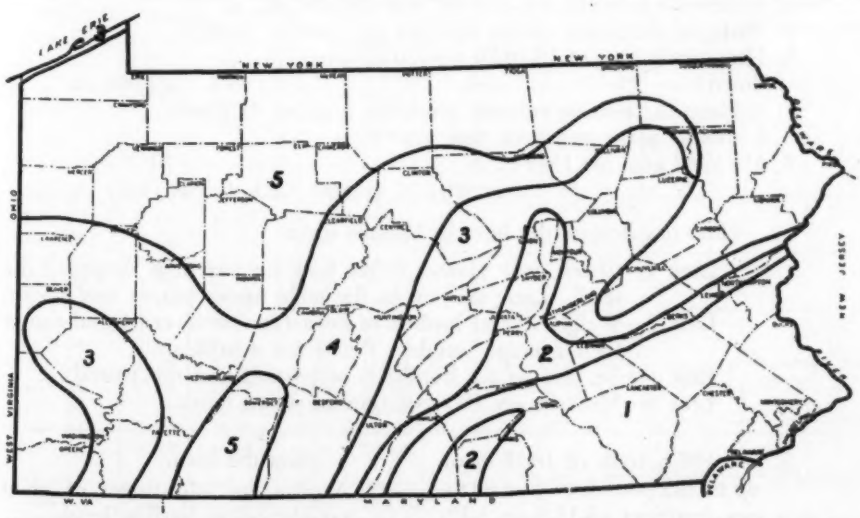
Many of the boys preferred closed-formula seed with which they were acquainted, but others chose hybrids in accordance with the accompanying Table I and map.

B. A suggested fertilizer program:

1. Lime the soil to pH 6. Don't guess—*test* soil for acidity.
2. Plant corn following a sod—a *legume* sod is much to be preferred.
3. Add at least 8 to 10 tons of manure. Each ton of manure should be treated with 50 pounds of 20 per cent superphosphate while in the stable.
4. On soils low in nitrogen, phosphorus, and potash, heavy supplemental applications of 10-10-10 have produced large, profitable increases in corn yields. The amount that should be applied will depend on the fertility level of your soil. (300 to 800 pounds of 10-10-10 gave profitable results last year.) Planting rates must be increased by 1,000 plants for every 100 pounds of 10-10-10 added. This seems to be a good general rule if the present planting rate is adjusted to the fertility of the soil in your field.

TABLE I.—SUGGESTED ADAPTED HYBRIDS.

	Quickest ripening		to	Slowest ripening	
Area 1	Ia. 4059	Oh. C 88	Oh. C 12	U. S. 13	Oh. L 86
Area 2	Oh. K 24 Pa. 611 Pa. 612	Ia. 939	Ia. 4059 Pa. 612	Oh. W 10	Oh. C 12 U. S. 13
Area 3	Oh. M 15	Pa. 5602	Oh. K 24 Pa. 611	Ia. 939 Ia. 4059	Oh. W 10
Area 4	Wis. 335	Wis. 412	Oh. M 15	Pa. 5602	Oh. K 24 Pa. 611 Pa. 612
Area 5	Wis. 275		Wis. 335	Wis. 412	Oh. M 15



There are five main areas, determined on the basis of temperature, soil, and other factors that bear upon corn production. The hybrids listed are recommended for the areas indicated.

TABLE II.—PLANTING CHART.

Plants per acre	Pounds seed required per acre			Inches between rows	Inches between plants in rows
	Large rounds	Med. flats	Large flats		
8,000.....	7¼	6¼	7¾	36 38 40 42	21.8 20.7 19.6 18.7
10,000.....	9	8	9¾	36 38 40 42	17.4 16.5 15.7 14.9
12,000.....	11	9¼	11½	36 38 40 42	14.5 13.8 13.1 12.4
14,000.....	12¾	11	13½	36 38 40 42	12.4 11.8 11.2 10.7
16,000.....	14½	12½	15½	36 38 40 42	10.9 10.3 9.8 9.3

SOIL FERTILITY-PLANT POPULATION BALANCE SHEET.

1. Plants per acre in 1948 corn field .....
2. Average weight of ears in 1948 crop (in tenths of a lb.) .....
3. Average weight of efficient ears (in tenths of a lb.) .6
4. Difference between my ear wt. and efficient wt. is .....
5. Multiply difference (from item 4) by 2,000 = 2,000 × = ...
6. How many *bags* of 10-10-10 are you plowing down? ..... ×1,000 = ...
7. Adding the outside column gives the number of plants I should plant per acre this year..... .....
8. My yield goal for 1949 = .6 70
   (ear wt.) × (plants /A.) ÷ (wt./bu.) = ...

How to calculate the lines in balance sheet

Line 1—Check your planter to see how far part it is dropping the seed. Look this up in the table under proper row width.

Line 2—Weigh several bushels of corn (run-of-the-crib) and figure their average weight. Better use a milk scale.

Line 6—Be sure to use hundreds of pounds and not pounds.

Line 8—Must be on 15.5 per cent moisture basis.

5. Use 100 pounds of 10-10-10 or up to 300 pounds of low nitrogen fertilizer (3-12-6 or 3-12-12) in the planter when you plant the corn.

C. A plan for adjustment of plant population to fertility level.

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Fertilizer Trends in South Carolina

By B. D. Cloaninger

Department of Fertilizer Inspection and Analysis, Clemson Agricultural College, Clemson, South Carolina

CONSIDERABLE progress has been made in the manufacture and use of commercial fertilizers in South Carolina during the past 60 years. Farmers no longer sit at the cross-roads store and argue as to whether an old 2.5-8-1 mixture, containing 11½ units of plant food applied at the rate of 200 pounds per acre through a guano horn, is too strong for their land. They now talk in terms of 20 units or more of plant food applied broadcast or in bands at the rate of 1,200 to 2,000 pounds per acre.

Within the past 60 years our average analysis of complete fertilizers in South Carolina has increased from the equivalent of a 1.81-8.30-1.34 analysis in 1888-89 to a 3.88-9.69-6.50 analysis in 1948-49; the average total plant-food content has increased from 11.45 to 20.07 units for the periods just mentioned. As noted in Table I, the element potash has enjoyed the greatest increase of any in the complete fertilizer, with nitrogen next, followed by phosphoric acid.

Other than for the World War I period and the depression years, there has been a continued increase in analyses and total plant-food content. Farmers are rapidly learning that it is a better practice to use fewer pounds of a high-analysis mixture, thus reducing the cost of handling, bags, and

TABLE I. AVERAGE ANALYSIS AND TOTAL PLANT-FOOD CONTENT OF COMPLETE FERTILIZERS USED IN SOUTH CAROLINA FOR THE PERIODS SHOWN.

Years	Nitrogen	Phosphoric acid	Potash	Total plant-food content
1888–89...	1.81	8.30	1.34	11.45
1893–94...	2.08	9.27	1.79	13.14
1898–99...	2.24	9.32	2.21	13.77
1903–04...	2.46	9.12	2.90	14.48
1908–09...	2.49	9.16	3.08	14.73
1913–14...	2.83	8.79	3.75	15.37
1918–19...	2.43	8.82	2.23	13.48
1923–24...	2.97	9.06	3.52	15.55
1928–29...	3.27	9.29	4.03	16.59
1933–34...	2.92	8.75	3.76	15.43
1938–39...	3.10	8.36	4.57	16.03
1943–44...	3.62	9.55	5.70	18.87
1948–49...	3.88	9.69	6.50	20.07

Prior to August 1939, grades were stated as phosphoric acid, ammonia, and potash. All figures above represent nitrogen, phosphoric acid and potash.

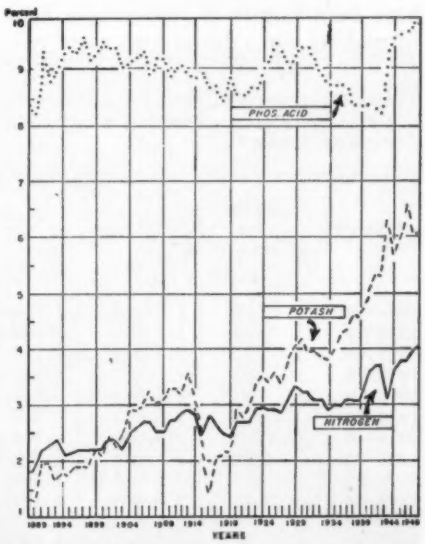

Fig. 1. Trends in the consumption of nitrogen, phosphoric acid, and potash in complete fertilizers in South Carolina, 1888-1948.

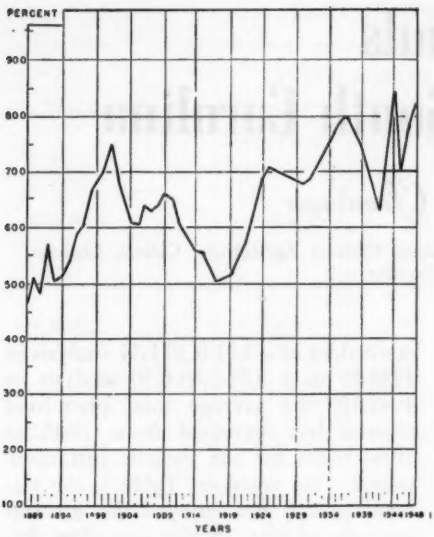

Fig. 2. Percentage of total consumption of complete fertilizers represented by four leading grades in South Carolina, 1888-1948.

freight on the "make-weight" or inert materials used to "balance out" a ton. Higher-analysis materials and better manufacturing facilities along with improved farm machinery for applying the fertilizer to the soil in a manner that will not injure seed germination have been factors of considerable help in making for a better and more economical fertilizer program in South Carolina.

Through the concerted efforts and close cooperation of all agricultural workers, the fertilizer industry, and the desire of farmers for a better product, the number of grades of fertilizer in South Carolina has been reduced from 200, plus 75,000 tons of Customers' Mixtures not reported, to 29 grades.

Four of the 29 grades sold represented 84.4 per cent of all sales, whereas six grades represented 95 per cent of all sales. Even though it is generally agreed that two grades will meet almost any farm need, certainly six or not over eight should meet the needs of all farmers of the State. It is reasonable to suppose that a fertilizer manufacturer can prepare several grades more economically than he can 40 or more.

As noted from Table III, during the period when low-analysis mixtures dominated, the ratios of nitrogen to phosphoric acid were rather wide. As the analysis increased the ratios of nitrogen, phosphoric acid, and potash in a complete fertilizer narrowed; in fact for 1948-49 it was 1:2.50:1.68.

The South Carolina fertilizer law gives the Board of Fertilizer Control, composed of members of the Board of Trustees of The Clemson Agricultural

TABLE II. THE NUMBER OF GRADES, THE FOUR LEADING GRADES, AND THE PER CENT TOTAL TONNAGE OF THE LEADING GRADES USED IN SOUTH CAROLINA FOR THE PERIODS SHOWN.

Years	Number grades	(1)	(2)	(3)	(4)	Per cent of total tonnage of leading grades
1888–89....	43	1.7–8–1	2.1–8–1	1.7–9–1.3	1.7–8–2	46.7
1893–94....	36	1.7–8–1	2.1–8–1	1.7–8–2	2.1–8–1.5	51.6
1898–99....	21	2.1–8–1	1.7–8.5–2	1.7–8–1	1.7–9–2	68.7
1903–04....	18	1.7–8.7–2	2.1–8–1	2.5–8–3	3.3–8–4	61.7
1908–09....	50	1.7–8.8–2	2.5–8–3	3.3–8–4	2.1–8–1	65.9
1913–14....	146	2.5–8–3	3.3–8–4	1.7–9.2–2	2.1–8–1	55.2
1918–19....	52	2.5–8–3	2.1–8–1	2.5–8–2	1.7–8–2	51.3
1923–24....	71	2.5–8–3	3.3–8–4	4.1–7–5	3.3–10–4	68.4
1928–29....	72	2.5–8–3	3.3–8–4	4.1–7–5	3.3–12–4	68.0
1933–34....	40	2.5–8–3	4.1–7–5	3.3–8–4	3.3–10–4	75.1
1938–39....	142	2.5–8–3	4.1–7–5	3.3–8–4	3.3–8–6	74.3
1943–44....	24	3–9–6	4–10–6	5–10–5	4–10–4	84.6
1948–49....	29	4–10–6	3–9–9	5–10–5	3–9–6	84.4

TABLE III. TRENDS IN THE RATIOS OF THE COMPLETE FERTILIZERS USED IN SOUTH CAROLINA FOR THE PERIODS SHOWN.*

Year	Nitrogen	Phosphoric acid	Potash
1888–89.....	1	4.59	.74
1893–94.....	1	4.45	.86
1898–99.....	1	4.16	.98
1903–04.....	1	3.71	1.18
1908–09.....	1	3.68	1.24
1913–14.....	1	3.11	1.33
1918–19.....	1	3.63	.92
1923–24.....	1	3.05	1.19
1928–29.....	1	2.84	1.23
1933–34.....	1	3.00	1.29
1938–39.....	1	2.69	1.47
1943–44.....	1	2.64	1.57
1948–49.....	1	2.50	1.68

*Prior to August 1939, grade stated as phosphoric acid, ammonia, potash. All figures above represent nitrogen, phosphoric acid and potash.

College, authority to establish a maximum of 25 grade ratios. The most popular ratios in order of amount used during 1948-49 were as follows: 2-5-3 (48.3 per cent); 1-3-3 (14.7 per cent); 1-2-1 (11.2 per cent); 1-3-2 (10.2 per cent). Since there is a definite relationship to the amount of each plant nutrient absorbed or used by the plant, increased emphasis needs to be placed on the ratios of the nutrient included in the fertilizer mixtures. Strictly speaking, our fertilizer problems boil down to the ratio of the nutrients to each other and to pounds of plant food rather than the analysis and fraction of a ton of the mixture applied per acre. In speaking of ratios, one is reminded of the ignorant sharecropper, who when asked what kind of fertilizer he wanted, said, "I want a naught, double naught."

Only about one-fifth as much fertilizer was used in 1891-92 as in 1948-49. Not only has the tonnage increased but the plant-food content of the complete fertilizer has about doubled during the past 60 years. The amount of fertilizer and fertilizer materials used in South Carolina has increased constantly since 1891-92, the peak being reached for 1920, at which time the tonnage was 1,106,941. The tonnage for 1948-49 was the highest since 1920-21. A complete analysis shows there is a very close correlation between land prices, farm income, and fertilizer consumption. As the fertilizer tonnage has increased, crop yields and returns from pastures have likewise increased. See Table IV.

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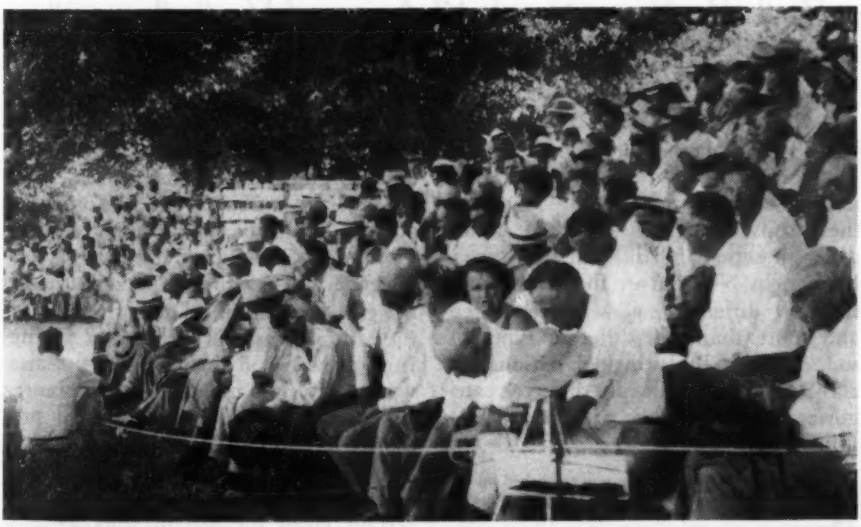

Fig. 3. Pictured above is part of the crowd of 450 that attended the 1949 meeting at the Edisto Experiment Station, Blackville, South Carolina.

Fig. 1. More than 16,000 stalks of corn per acre on Delanco sandy loam.

Know Your Soil*

I. Delanco Sandy Loam

By J. B. Hester, F. A. Shelton, and R. L. Isaacs, Jr.

Department of Agricultural Research, Campbell Soup Company, Riverton, New Jersey

A STUDY of the various soil reports reveals that there exists a very large number of different soils. Many of these soils have been classified under different series and different soil types. In fact, in New Jersey there are more than 50 different soil series classified and more than 190 different types of soil. One of the principal reasons for classifying these soils into different categories is to encourage a more efficient utilization.

During the summer of 1949 the climatic conditions at Cinnaminson, New Jersey, were extremely varied from average conditions, particularly in reference to rainfall. The mean rainfall is between 3 and 4.5 inches per month for the growing season. During May 1949 the rainfall was 5.44 inches, but during June it was 0.33 inches. August also was a dry, hot month. Furthermore, the rainfall in July was confined primarily to two hard rains. It, therefore, is obvious that the erratic conditions affected crop yield very much. In fact, certain crops on certain soils were a complete failure. This is why it is im-

*In January 1945 an article was published on the subject of "Know Your Soils." The primary purpose of this article was to point out the extreme differences in soils and what could be done to utilize efficiently the particular soils that a grower has on his farm.

portant to examine the soil concerned—Delanco sandy loam—located at Cinnaminson, N. J.

This particular field was divided into three approximately equal sections, one planted to corn, one to tomatoes, and the other to oats. In face of the erratic climatic conditions and without irrigation, the area planted to corn yielded 102 bushels per acre, tomatoes—15 tons, and oats—78 bushels per acre. Because of these above-average yields, an investigation of this soil was prompted.

Soil Profile

A hole approximately 5 x 5 x 5 feet was dug between the corn and tomato rows. A descriptive drawing of this soil is shown in Figure 1. The roots of the corn penetrated to and were about equally distributed throughout the first 46 inches. The roots of the tomatoes penetrated to a depth slightly greater than the corn, but avoided the gray, leached horizon at the 9-23-inch depth. All of the roots concentrated in the clay section of the soil particularly around the 34-inch depth. Below this clay horizon was concentrated a gray and red mottled compact clay. Root penetration practically stopped at this depth. The compact clay tended to prevent the movement of water and root penetration. Immediately under the A_p horizon was a plow sole which undoubtedly had been developed over a period of years due to a constant depth of plowing. While this layer was compact, it obviously had little or no influence on yield.

Soil Analyses

Data in Table I shows the results of the mechanical analysis of the soil. These results bear out the fact that there was a concentration of clay in the lower depths. It becomes obvious that this soil, to the ultimate depth, has the capacity for holding approximately 5 million pounds of water to the acre. According to most of the published figures, this is sufficient to produce 100 bushels of corn per acre if evaporation from the soil did not occur. The water at the maturity of the crops had been exhausted as far down as the B_1 horizon. Moisture still existed in the B_2 horizon to the extent of approximately 15 per cent.

The chemical analyses shown in Table II are very revealing. There was a concentration of readily available potash in the B_1 and B_2 horizons of the soil. This is shown by the sodium acetate extraction and the total replaceable. From the estimation of the organic matter and other available plant nutrients shown in Table II, it becomes

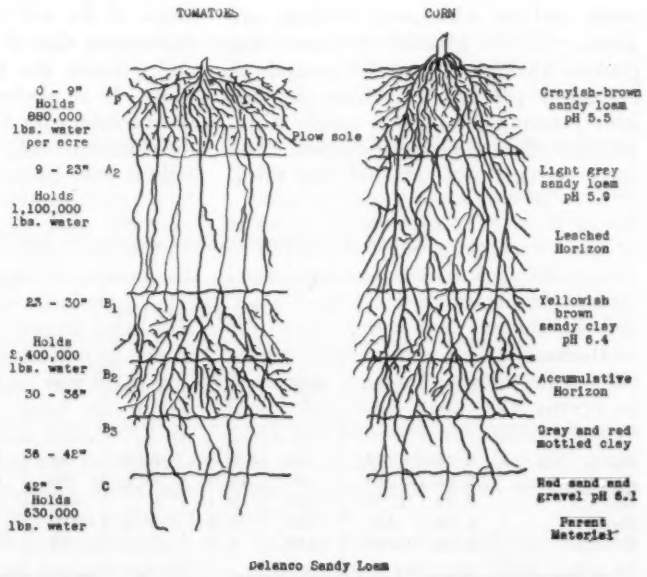

Fig. 2. Pattern of tomato and corn root penetration in this soil.

TABLE I—MECHANCAL ANALYSES OF SOIL.

Horizon	Per cent				
	Gravel	Sand	Silt	Clay	Water*
A_p	3	79	10	8	4.0
A_2	0	75	15	10	3.7
B_1	11	42	24	23	8.5
B_2	7	39	28	26	15.0
C	25	44	12	19	10.5

*110° C.

obvious that this was not a fertile soil. Consequently, the method of fertilization used in producing these yields becomes interesting.

Fertilization

The particular area of soil in question has been used for the growth of tomato seedlings for a number of years and has not been fertilized with commercial fertilizer since 1942. The whole area after spring plowing received a broadcast of 1,000 pounds of a 4-8-12 fertilizer carrying 20 pounds each of borax and manganese sulfate per ton of fertilizer. The oats were sown and no additional fertilizer applied. U. S. Hybrid 13 corn was planted on May 19 and 300 pounds of cyanamid per acre broadcast the day after planting the corn to supply nitrogen and effect some weed control. The corn perhaps was planted too thick. There were more than 16,000 stalks per acre and some stalks did not produce. The corn was cultivated only twice and very little grass appeared. At approximately the knee-high stage, 500 pounds of a 7-7-11 fertilizer and 200 pounds of ammonium nitrate per acre were applied as a sidedressing. From visual observation this corn did not suffer from a lack of moisture at any time during the growing period.

The tomatoes received, in addition to the 4-8-12 fertilizer, 500 pounds of a 7-7-11 fertilizer per acre as a sidedressing. This fertilizer contained 1 per cent borax, 3 per cent magnesium oxide, 2 per cent manganese sulfate, and traces of copper, zinc, and molybdenum. It is obvious from the treatment of this soil that an abnormal amount of fertilizer was not used. The nature of the soil was such that leaching was minimized and the total water-holding capacity was great. The study of the soil profile obviously reveals the reason for it being possible to grow these crops in the face of adverse weather conditions.

In order for any grower to rationally fertilize and cultivate his field, it is essential that a knowledge of the properties of the soil be known. It is for this reason that it is intended to study and present the facts about different soils. It is obvious that irrigation is not necessary for tomatoes and corn on the Delanco soil, whereas with other soils it may be profitable.

TABLE II—CHEMICAL ANALYSES OF SOIL.*

Horizon	Pounds per acre								% Organic matter
	pH	CaO	MgO	N as NO_3	P_2O_5	K_2O	Al	Mn	
A_p	5.45	330	33	6.8	60+	48	0.8	0.6	1.1
A_2	5.95	200	90	15.8	60+	50	0.6	0.8	0.4
B_1	6.35	1275	270	2.1	6	420	0.9	1.2	0.3
B_2	6.25	425	100	1.8	3	110	1.2	0.4	0.5
C	6.00	200	110	3.0	3	98	0.8	0.4	0.2

*Sodium acetate extract.

Fig. 1. Adequate fertilizer, added to ponds on favorable sites, is a must for higher production of fish.

More Fish and Game

By Verne E. Davison

Regional Biology Division, Soil Conservation Service, Spartanburg, South Carolina

MORE than 25 million Americans hunt or fish. Still more would enjoy hunting and fishing if they had a successful place to do so. Demand exceeds the supply almost everywhere; unfortunately the supply is spotty, inadequate, and poorly developed.

We have had a traditional belief that everyone is entitled to hunt and fish in our great states—across the fields and through the woods, and down the streams and around our lakes. All we once asked of ourselves was to buy a license, obey the laws, and limit our harvest to something less than a glutten would carry home. It is becoming evident, however, that an ever-increasing number of people can find little if any hunting and fishing available to themselves and their families.

Conservation is not enough. Conservation means only to save—to guard —to protect. We must turn now to production—agricultural production—if we want good hunting and fishing. We must grow five pounds of fish where nature supported but one, and grow fish where no water existed before. We must grow two coveys of quail, two squirrels, two rabbits, where only one is now able to live, and grow more where none have survived in recent years.

Anyone who owns land can improve it; can make it produce more game or fish or both. And (with a few ex-

Fig. 2. Every pond deserves protection against erosion and excessive run-off. Fine pasture is just one of the land treatments which favor wildlife indirectly in soil and water conservation farming.

ceptions) he can have more regardless of what his neighbors do with their lands. These lands and waters will continue to support only meager populations of fish and game unless the management of water and wildlife land is included as a part of everyday farming. The decision is not in the hands of sportsmen alone, as many have believed. It is a determination to be made individually by the man who owns or works the land. Encouragement by hunters and fishermen, and by agricultural and wildlife leaders, is needed. One should never forget that fish and game production is an elective to be employed or ignored as the landowner wishes.

How many have a place to hunt or fish where the sport is as good as it was 10 years ago? Not one in a hundred, in my experience. Almost invariably, the rare few who have better hunting or fishing have made it better by increasing the necessary food on their lands or in their ponds. Or they have a farmer friend who has done it.

This, then, may well become our traditional thought: The right to good hunting and good fishing must be EARNED by dependable effort to PRODUCE the game and fish we seek.

We glibly think of America as having been a paradise of fish and fowl and big game before white men came with their axes and plows and livestock and modern industries. It wasn't so! The whole country supported no cows or horses or sheep or any domestic stock. The Indians and the explorers starved to death for lack of food. It was a country where agriculture was practiced only in the most primitive way. It is agricultural development which has made it possible for America to support 150 million people at home and many others abroad, where less than a single million eked out a living 400 years ago. It will be agricultural development, largely, that builds the game and fish supply to provide more for the present and future demand.

There was an earlier time when all men lived entirely on wild fruits and roots, wild bird eggs, and what animal life they could catch. Man ate no wheat or rice or corn because these foods grew too sparsely for him to harvest. Then man discovered agriculture—learned that he can support more people and more livestock on any land, by choosing the plants he wants and excluding the

ones useless to his needs for food, clothing, and shelter.

The productivity of land and waters for wildlife can be increased in the same ways. We are doing it with farm ponds for fish, with bicolor lespedeza for quail, with multiflora rose for rabbits, and in a general way for several kinds of wild creatures by the land-use improvements inherent with application of the best soil and water conservation measures.

Ten years ago the idea of increasing fish production by fertilizing pond waters was called "impractical, theoretical, ridiculous." But those who termed it so could not tell how to increase the average yield of fish from 10 or 15 pounds per acre annually to 100 or 200 pounds each year. Swingle and Smith, Alabama Agricultural Experiment Station, discovered the way to high production of fish in ponds. We have followed their methods successfully on thousands of farm ponds in soil conservation districts. Today every Soil Conservation Service technician can show the farmers in his work area where to build good ponds, and where not to build them, too. He can predict good yields with certainty to the pond owner who will follow simple instructions on (1) selecting the site, (2) dam and bank construction, (3) proper stocking, (4) high fertilization, and (5) consistently regular care. *An acre of water today can provide 10 times the fishing entertainment possible 10 years ago.*

By making every square foot of a one-eighth-acre plot produce a heavy crop of bicolor seed (40 or 50 pounds per patch) a covey of quail can be fed better than nature or man has ever fed them before. The Soil Conservation Service worked out this production technique in answer to a very large demand for permanent, economical means of bobwhite management. The same principle of "high yield of food on small areas" is equally important if one wants to grow corn, or annual lespedeza, or soybeans, or any other game food.

Southeastern lands, like all others, will not clothe and feed people sufficiently unless fertilizer, soil culture, and the right kinds of soil and water conservation measures are applied to over-

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Fig. 3. Fifty pounds of quail food can be grown on one-eighth-acre strips, if fertilizer is applied when needed. Birds increase with ample food.

A Simplified Field Test for Determining Potassium in Plant Tissue

By S. W. Melsted

Department of Agronomy, University of Illinois, Urbana, Illinois

THE use of rapid chemical tests to determine the presence or absence of ions in plant sap is an accepted technique in determining plant-nutrient deficiencies. These tissue tests vary considerably in their ease of operation and in the amount of equipment necessary for their use. The potassium test described here is the well-known dipicrylamine spot test modified and adapted for field use.

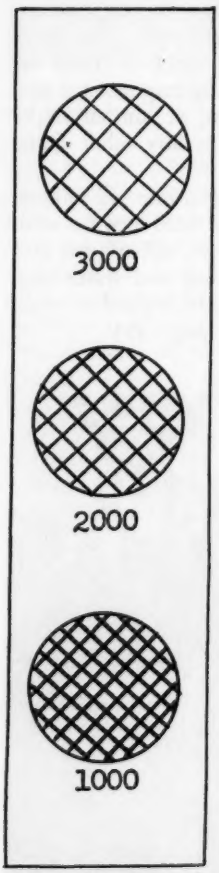

Fig. 1. Illustration of the general appearance of test papers.

One of the common techniques used in spot-test work is to place a drop of the test reagent on a strip of filter paper and allow it to dry. Then, when a test is to be made, a drop of the unknown solution is applied to the test-spot area on the filter paper and the color change noted. The use of such techniques as field tests has several advantages. The equipment is easily transported and the tests easily and rapidly performed, requiring little special skill. Their disadvantages are their lack of quantitative accuracy and their lack of a sufficient range of measurement required for satisfactory tissue-testing work. The technique suggested here for a field plant-tissue test for potassium is an attempted compromise between quantitative accuracy and ease of operation.

The test is essentially as described by Feigl (1). A drop of the test reagent is placed on a strip of filter paper and allowed to dry. Then a drop of the plant sap is squeezed onto the test spot, allowed to react for about 30 seconds, and then the paper is immersed in a solution of 0.5 normal hydrochloric acid for about 30 seconds. If a reddish-orange spot remains, potassium is present; otherwise the test spot turns a lemon-yellow color. By varying the concentration of the reagents used to make the spots, it is possible to prepare test papers that are sensitive to different levels of potassium in solution. Or, as is the case here, it is possible to prepare a filter paper strip impregnated with a series of test spots each of which is sensitive to a different level of potassium.

Preliminary work with corn, soybeans, and alfalfa has indicated that if the concentration of potassium in the expressed sap is below 2,000 ppm the plants are growing on soil that probably would have responded to potash fertilization. If the potassium concentration

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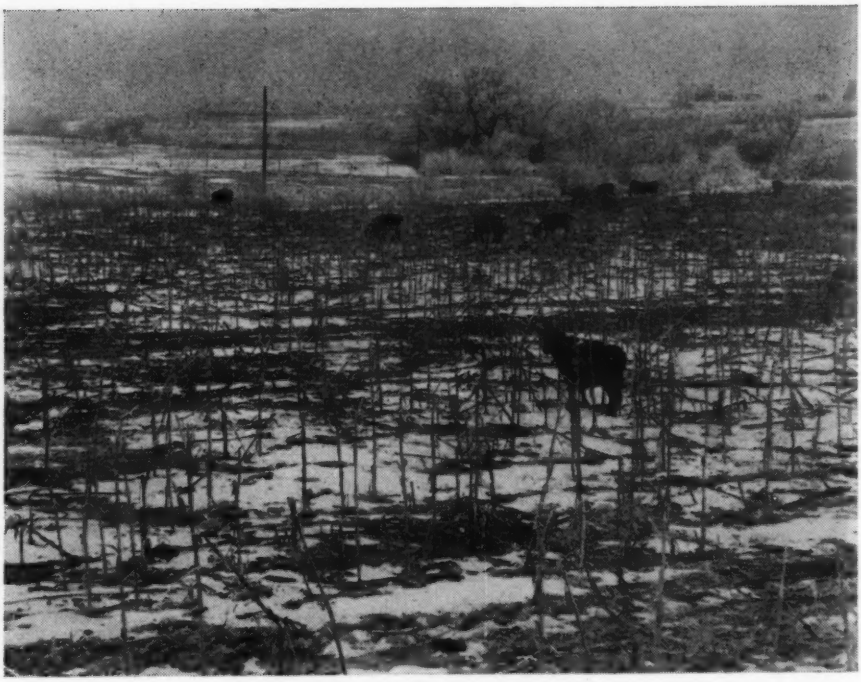
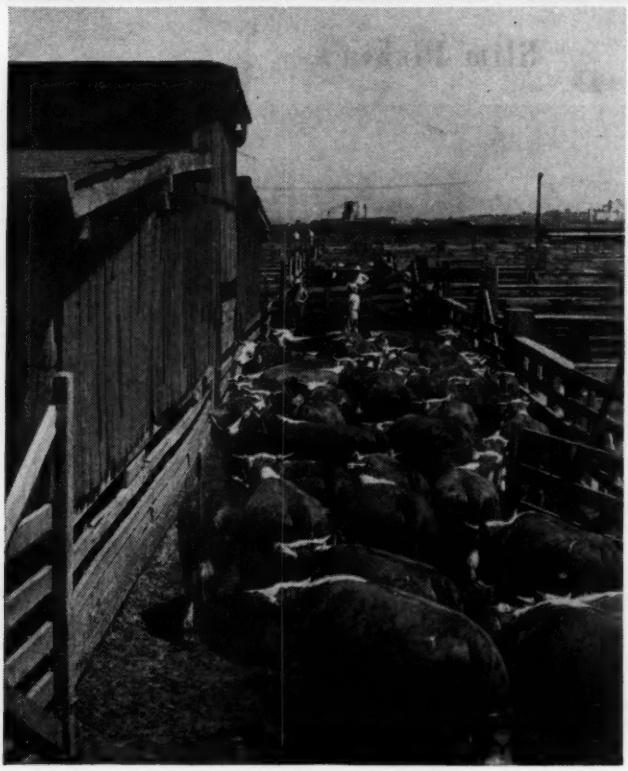
PICTORIAL

T. J. Bird, Jr., with a 3-day-old ram on the Bird Farm, Merkel, Texas.

Slow Going



Slim Pickin's



Above: The grand champion steer at the International Livestock Exposition, Chicago, was Judge Roy Bean, entered by the Pecos county, Texas, 4-H Club. He was purchased at a record price of $11.50 per pound by Dearborn Motors, Detroit. The club will use the money ($13,800) to take its members on an educational tour. Posing with the champion are: W. T. Posey, Pecos county extension agent; Morris Kreidel, Howard Morgan, Sim Reeves, Henry McIntyre, Albert Hallford, and Frank Baker, members of the club which owned the steer; W. R. Moody, club leader, who fed the animal; Will Slaten, another member of the 4-H Club who originally owned the steer and raised it from a calf, and David Meeker, director of education for Dearborn Motors, who made the record bid.

Left: These steers aren't champions but look as though they will be classified as "prime" beef.

The Editors Talk

Looking Ahead

The outlook for farmers in 1950 is for a year of high production, although they may not be called upon to produce as much as during the last two record-breaking years. According to the Bureau of Agricultural Economics, U. S. Department of Agriculture, the economic prospects for 1950 indicate that there will be another decline from the 1948 peak demand for farm products. Both business and consumers have been spending slightly less, apparently having satisfied their most urgent postwar demands. Total employment is somewhat smaller, resulting in lower incomes and smaller worker demand for farm products.

So far as the farm business itself is concerned the Bureau says that the downward trend of 1949 in prices and income will probably continue. Production will again be large if growing conditions are average. Increases in output of meat, milk, and eggs will almost offset declines in crop production. Cuts in crops are expected with acreage allotments already in sight for wheat, cotton, peanuts, tobacco, and some other major crops.

Although the volume of marketings may be almost as large, prices received by farmers in 1950 may average 10 per cent below this year, with a corresponding drop in cash receipts. This would be about the same as the decline from 1948 to 1949. Farmers' costs also will decline, probably more than in 1949, but again less than the decline in receipts. In 1949, gross farm income was down 10 per cent and net farm income 15 per cent from 1948. This pattern is likely to be repeated in 1950. If it is, net farm income still will be more than double prewar, but down nearly one-third from the 1947 peak.

With that picture in mind, how should the "business" farmer proceed? For farming is a business in every sense of the word and is subject to most of the factors which govern success in business.

First, he should take an inventory of his assets and review his gains or losses of the past year. It is not probable that a great many farmers make a practice of taking inventory despite the fact that such information, used with his records of sales and expenditures which must be kept for income tax purposes, provides him a means of checking on his investment in capital as well as in time and labor and discovering shifts to improve his financial status.

Next, the businessman looks into the capabilities of his production plant. In the case of a farmer this would be the fertility of his soil. H. H. Bennett, Chief of the Soil Conservation Service, has urged completion of detailed surveys to determine the capability and conservation needs of the nation's farms at the earliest possible date. Surveys already made have shown that now being cultivated are many millions of acres that should go out of cultivation into permanent pasture or into quick-growing trees. This is important to the individual farmer, Dr. Bennett believes, because it means efficiency in production and, in the long run, will mean a more stable income.

But the individual farmer does not have to wait for the soil survey. The ever-increasing soil-testing facilities make it possible for him to have samples of his

fields tested for their plant-food content and to receive guidance on fertilization to produce the high yields and quality which result in lower per-unit costs. R. H. Bray, widely known soil scientist and a Professor of Soil Fertility, Illinois Agricultural Experiment Station, has this to say: "Soil tests tell when to use fertilizer and when not to use it, and guarantee a farmer a three- to five-fold profit from its use. Fertilizer use is climbing despite the end of the war and crop surpluses are accumulating. If crop prices were cut in half, fertilizer use would still be profitable where a soil-testing system is followed. Production is still going up as more and more acres are built up to maximum fertility."

Space does not permit outlining here other business practices which farmers should be considering in their planning for 1950. The two mentioned, however, are of prime importance and should be, as they *are* being, urged upon growers before the rush of the planting season begins.

Protecting Soils

Agricultural Science always constitutes a big and important "Section" when the American Association for the Advancement of Science convenes. In connection with the Association's last meeting, the University of Wisconsin, College of Agriculture, issued a press release which we believe will be of wide interest among our readers. It is quoted below in full:

New York, Dec. 30, 1949: Soil conservation would progress much faster if farmers and others worked more to increase soil fertility, Emil Truog, University of Wisconsin soil scientist, told the American Association for the Advancement of Science here today.

Measurements in billions of dollars will fail utterly to show the full loss to society of soil washed from farm land onto highways and into rivers, lakes, and other water supply sources, he warned.

You would think, Truog pointed out, that damage from soil loss is so great and so apparent that all would be interested in stopping it.

One reason he said that farmers seemed to lack interest was that terraces, waterways, and strip-cropping do not immediately increase crop yields.

If more emphasis were put on building up the soil fertility we would get soil conservation and increased production all at one time, he told the scientists. "Farmers would have an incentive to spend money on soil conservation."

Truog outlined five ways in which increased fertility would hasten the job of soil conservation.

1. Fertile soils produce a heavier plant growth that shields and protects the soil against washing.
2. Heavy plant growth would remove more water from the soil, allowing it to soak up more rainfall, cutting the amount that would run off.
3. Fertile soil is in better condition to soak up rainfall than poor soil is.
4. More fertile soils would increase yields, giving farmers a greater incentive to use soil conservation methods.
5. Fertile soils help provide farmers with the money needed to build terraces, waterways, and the like.

Truog called for closer coordination in the work of the extension service, the soil conservation service, and other agencies in protecting the soils of the country.

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb. Aug.-July	Tobacco Cents per lb.	Potatoes Cents per bu. July-June	Sweet Potatoes Cents per bu. July-June	Corn Cents per bu. Oct.-Sept.	Wheat Cents per bu. July-June	Hay[1] Dollars per ton July-June	Cottonseed Dollars per ton July-June	Truck Crops ....
Av. Aug. 1909–July 1914....	12.4	10.0	69.7	87.8	64.2	88.4	11.87	22.55	.....
1924.....	22.9	19.0	68.6	149.6	106.3	124.7	12.66	33.25	....
1925.....	19.6	16.8	170.5	165.1	69.9	143.7	12.77	31.59	....
1926.....	12.5	17.9	131.4	117.4	74.5	121.7	13.24	22.04	....
1927.....	20.2	20.7	101.9	109.0	85.0	119.0	10.29	34.83	....
1928.....	18.0	20.0	53.2	118.0	84.0	99.8	11.22	34.17	....
1929.....	16.8	18.3	131.6	117.1	79.9	103.6	10.90	30.92	....
1930.....	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931.....	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932.....	6.5	10.5	38.0	54.2	31.9	38.2	6.20	10.33	....
1933.....	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934.....	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935.....	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936.....	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937.....	8.4	20.4	52.9	78.0	51.8	96.2	8.74	19.51	....
1938.....	8.6	19.6	55.7	69.8	48.6	56.2	6.78	21.79	....
1939.....	9.1	15.4	69.7	73.4	56.8	69.1	7.94	21.17	....
1940.....	9.9	16.0	54.1	85.4	61.8	68.2	7.59	21.73	....
1941.....	17.0	26.4	80.8	92.2	75.1	94.4	9.70	47.65	....
1942.....	19.0	36.9	117.0	118.0	91.7	110.0	10.80	45.61	....
1943.....	19.9	40.5	131.0	206.0	112.0	136.0	14.80	52.10	....
1944.....	20.7	42.0	150.0	190.0	109.0	141.0	16.50	52.70	....
1945.....	22.5	36.6	143.0	204.0	127.0	150.0	15.10	51.10	....
1946.....	32.6	38.2	124.0	218.0	156.0	191.0	16.70	72.00	....
1947.....	31.9	38.0	162.0	217.0	216.0	229.0	17.60	85.90	....
1948.....	31.0	38.7	153.0	219.0	136.0	205.0	19.00	67.80	....
1949									
January.....	29.27	42.9	166.0	236.0	125.0	202.0	19.80	65.70	....
February....	29.14	29.5	172.0	244.0	112.0	194.0	20.50	53.40	....
March.....	28.74	31.9	174.0	254.0	118.0	198.0	20.00	51.40	....
April.....	29.91	24.7	181.0	275.0	122.0	200.0	19.00	50.30	....
May.....	29.97	32.5	181.0	273.0	122.0	200.0	17.70	50.40	....
June.....	30.13	31.5	175.0	264.0	121.0	186.0	16.40	46.70	....
July.....	30.08	56.5	155.0	283.0	125.0	182.0	15.65	37.50	....
August.....	29.32	44.6	154.0	267.0	118.0	179.0	16.05	44.40	....
September...	29.70	48.7	138.0	230.0	116.0	187.0	16.25	43.50	....
October.....	28.70	47.4	130.0	196.0	109.0	189.0	16.75	41.80	....
November...	27.76	43.4	134.0	189.0	102.0	190.0	16.75	42.30	....
December....	26.50	45.4	131.0	202.0	113.0	193.0	17.15	43.30	....

Index Numbers (Aug. 1909—July 1914 = 100)

1924.....	185	190	98	170	166	141	107	147	143
1925.....	158	168	245	188	109	163	108	140	143
1926.....	101	179	189	134	116	138	112	98	139
1927.....	163	207	146	124	132	135	87	154	127
1928.....	145	200	76	134	131	113	95	152	154
1929.....	135	183	189	133	124	117	92	137	137
1930.....	77	128	131	123	93	76	93	98	129
1931.....	46	82	66	83	50	44	73	40	115
1932.....	52	105	55	62	50	43	52	46	102
1933.....	82	130	118	79	81	84	68	57	91
1934.....	100	213	64	91	127	96	111	146	95
1935.....	90	184	85	80	102	94	63	135	119
1936.....	100	236	164	106	163	116	94	148	104
1937.....	68	204	76	89	81	109	74	87	110
1938.....	69	196	80	79	76	64	57	97	88
1939.....	73	154	100	84	88	78	67	94	91
1940.....	80	160	78	97	96	77	64	96	111
1941.....	137	264	116	105	117	107	82	211	129
1942.....	153	369	168	134	143	124	91	202	163
1943.....	160	405	188	235	174	154	125	231	245
1944.....	167	420	214	216	170	160	139	234	212
1945.....	181	366	205	232	198	170	127	227	224
1946.....	263	382	178	248	212	209	141	319	204
1947.....	257	380	232	248	336	259	148	381	249
1948.....	250	387	220	249	212	232	160	301	238
1949									
January.....	236	429	238	269	195	229	169	291	282
February....	235	295	249	279	174	219	173	237	285
March.....	232	319	250	290	184	224	168	228	263
April.....	241	247	260	314	190	226	160	223	236
May.....	242	325	260	312	190	226	149	224	213
June.....	243	315	251	301	188	210	138	207	175
July.....	243	565	222	323	195	206	132	166	185
August.....	236	446	221	305	184	202	135	197	174
September...	240	487	198	263	181	212	137	193	205
October.....	231	474	187	224	170	214	141	185	170
November...	224	434	192	216	159	215	141	188	226
December....	214	454	188	230	176	218	144	192	206

Wholesale Prices of Ammoniates

	Nitrate of soda bulk per unit N	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia, Chicago, bulk, per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.37	$3.52
1924	2.99	2.44	5.87	5.02	3.60	4.25
1925	3.11	2.47	5.41	5.34	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.32	5.70
1928	2.67	2.30	7.06	6.63	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.61	5.72
1930	2.47	1.81	4.78	4.96	3.79	4.58
1931	2.34	1.46	3.10	3.95	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.67	3.27
1935	1.47	1.15	4.59	3.10	3.06	3.65
1936	1.53	1.23	4.17	3.42	3.58	4.25
1937	1.63	1.32	4.91	4.66	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.76	4.43
1942	1.74	1.41	6.11	5.77	5.04	6.76
1943	1.75	1.42	6.30	5.77	4.86	6.62
1944	1.75	1.42	7.68	5.77	4.86	6.71
1945	1.75	1.42	7.81	5.77	4.86	6.71
1946	1.97	1.44	11.04	7.38	6.60	9.33
1947	2.50	1.60	12.72	10.66	12.63	10.46
1948	2.86	2.03	10.11	10.59	10.84	9.85
1949						
January	3.15	2.23	10.29	8.68	11.53	11.53
February	3.19	2.27	9.44	12.36	10.78	10.70
March	3.19	2.27	9.27	12.36	9.64	9.71
April	3.19	2.27	9.22	12.36	9.71	9.87
May	3.19	2.27	9.43	12.36	9.71	9.11
June	3.19	2.28	9.65	13.34	10.02	9.71
July	3.19	2.32	11.07	14.97	11.53	10.78
August	3.19	2.32	11.88	14.49	12.75	12.14
September	3.19	2.32	9.83	14.53	11.53	11.53
October	3.08	2.32	9.94	14.58	11.29	11.65
November	3.00	2.32	10.39	14.21	10.39	10.78
December	3.00	2.32	12.94	13.88	9.87	9.94
	Index Numbers (1910-14 = 100)					
1924	111	86	168	142	107	121
1925	115	87	155	151	117	135
1926	113	84	126	140	129	139
1927	112	79	145	166	128	162
1928	100	81	202	188	146	170
1929	96	72	161	142	137	162
1930	92	64	137	141	112	130
1931	88	51	89	112	63	70
1932	71	36	62	62	36	39
1933	59	39	84	81	97	71
1934	59	42	127	89	79	93
1935	57	40	131	88	91	104
1936	59	43	119	97	106	131
1937	61	46	140	132	120	122
1938	63	48	105	106	93	100
1939	63	47	115	125	115	111
1940	63	48	133	124	99	96
1941	63	49	157	151	112	126
1942	65	49	175	163	150	192
1943	65	50	180	163	144	189
1944	65	50	219	163	144	191
1945	65	50	223	163	144	191
1946	74	51	315	209	196	265
1947	93	56	363	302	374	297
1948	107	71	370	300	322	280
1949						
January	118	78	294	246	342	328
February	119	80	270	350	320	304
March	119	80	265	350	286	276
April	119	80	263	350	288	280
May	119	80	269	350	288	259
June	119	80	276	378	297	276
July	119	81	316	424	342	306
August	119	81	339	410	378	345
September	119	81	281	412	342	328
October	115	81	284	413	335	331
November	112	81	297	403	308	306
December	112	81	311	393	293	282

Wholesale Prices of Phosphates and Potash * *

	Superphosphate, Baltimore, per unit	Florida land pebble, 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports[2]	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports[2]	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports[2]	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[2]
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657
1924	.502	2.31	6.60	.582	.860	23.72	.472
1925	.600	2.44	6.16	.584	.860	23.72	.483
1926	.598	3.20	5.57	.596	.854	23.58	.537
1927	.525	3.09	5.50	.646	.924	25.55	.586
1928	.580	3.12	5.50	.669	.957	26.46	.607
1929	.609	3.18	5.50	.672	.962	26.59	.610
1930	.542	3.18	5.50	.681	.973	26.92	.618
1931	.485	3.18	5.50	.681	.973	26.92	.618
1932	.458	3.18	5.50	.681	.963	26.90	.618
1933	.434	3.11	5.50	.662	.864	25.10	.601
1934	.487	3.14	5.67	.486	.751	22.49	.483
1935	.492	3.30	5.69	.415	.684	21.44	.444
1936	.476	1.85	5.50	.464	.708	22.94	.505
1937	.510	1.85	5.50	.508	.757	24.70	.556
1938	.492	1.85	5.50	.523	.774	15.17	.572
1939	.478	1.90	5.50	.521	.751	24.52	.570
1940	.516	1.90	5.50	.517	.730	24.75	.573
1941	.547	1.94	5.64	.522	.780	25.55	.367
1942	.600	2.13	6.29	.522	.810	25.74	.295
1943	.631	2.00	5.93	.522	.786	25.35	.195
1944	.645	2.10	6.10	.522	.777	25.35	.195
1945	.650	2.20	6.23	.522	.777	25.35	.195
1946	.671	2.41	6.50	.508	.769	24.70	.190
1947	.746	3.05	6.60	.498	.706	18.93	.195
1948	.764	4.27	6.60	.478	.681	14.14	.195
1949							
January	.770	4.61	6.60	.375	.720	14.50	.200
February	.770	4.61	6.60	.375	.720	14.50	.200
March	.770	3.85	7.06	.375	.720	14.50	.200
April	.770	3.85	7.06	.375	.720	14.50	.200
May	.770	3.85	7.06	.375	.720	14.50	.200
June	.770	3.66	7.06	.330	.634	12.76	.176
July	.770	3.60	5.87	.353	.679	13.63	.188
August	.770	3.60	5.47	.353	.679	13.63	.188
September	.770	3.65	5.47	.353	.679	13.63	.188
October	.770	3.75	5.47	.375	.720	14.50	.200
November	.770	3.76	5.47	.375	.720	14.50	.200
December	.770	3.76	5.47	.375	.720	14.50	.200
Index Numbers (1910-14 = 100)							
1924	94	64	135	82	90	98	72
1925	110	68	126	82	90	98	74
1926	112	88	114	83	90	98	82
1927	100	86	113	90	97	106	89
1928	108	86	113	94	100	109	92
1929	114	88	113	94	101	110	93
1930	101	88	113	95	102	111	94
1931	90	88	113	95	102	111	94
1932	85	88	113	95	101	111	94
1933	81	86	113	93	91	104	91
1934	91	87	110	68	79	93	74
1935	92	91	117	58	72	89	68
1936	89	51	113	65	74	95	77
1937	95	51	113	71	79	102	85
1938	92	51	113	73	81	104	87
1939	89	53	113	73	79	101	87
1940	96	53	113	72	77	102	87
1941	102	54	110	73	82	106	87
1942	112	59	129	73	85	106	84
1943	117	55	121	73	82	105	83
1944	120	58	125	73	82	105	83
1945	121	61	128	73	82	105	83
1946	125	67	133	71	81	102	82
1947	139	84	135	70	74	78	83
1948	143	118	135	67	72	58	83
1949							
January	144	128	135	68	76	60	83
February	144	128	135	68	76	60	83
March	144	107	145	68	76	60	83
April	144	107	145	68	76	60	83
May	144	107	145	68	76	60	83
June	144	101	145	62	67	53	80
July	144	100	120	65	71	56	82
August	144	100	112	65	71	56	82
September	144	101	112	65	71	56	82
October	144	104	112	68	76	60	83
November	144	104	112	68	76	60	83
December	144	104	112	68	76	60	83

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer material‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash**
1924	143	152	143	103	97	125	94	79
1925	156	156	151	112	100	131	109	80
1926	146	155	146	119	94	135	112	86
1927	142	153	139	116	89	150	100	94
1928	151	155	141	121	87	177	108	97
1929	149	154	139	114	79	146	114	97
1930	128	146	126	105	72	131	101	99
1931	90	126	107	83	62	83	90	99
1932	68	108	95	71	46	48	85	99
1933	72	108	96	70	45	71	81	95
1934	90	122	109	72	47	90	91	72
1935	109	125	117	70	45	97	92	63
1936	114	124	118	73	47	107	89	69
1937	122	131	126	81	50	129	95	75
1938	97	123	115	78	52	101	92	77
1939	95	121	112	79	51	119	89	77
1940	100	122	115	80	52	114	96	77
1941	124	131	127	86	56	130	102	77
1942	159	152	144	93	57	161	112	77
1943	192	167	151	94	57	160	117	77
1944	195	176	152	96	57	174	120	76
1945	202	180	154	97	57	175	121	76
1946	233	202	177	107	62	240	125	75
1947	278	246	222	130	74	362	139	72
1948	287	264	241	134	89	314	143	70
1949								
January	268	260	233	136	97	313	144	72
February	258	257	231	136	99	309	144	72
March	261	258	231	134	99	290	144	72
April	260	258	229	134	99	291	144	72
May	256	257	227	134	99	293	144	72
June	252	257	223	134	99	304	144	65
July	249	256	225	140	100	349	144	68
August	245	254	222	143	100	372	144	68
September	249	253	225	138	100	334	144	68
October	243	251	222	138	98	331	144	72
November	239	250	221	136	96	321	144	72
December	236	251	220	136	96	317	144	72

*U. S. D. A. figures. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

†Department of Labor index converted to 1910-14 base.

‡The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1]Beginning July 1949, baled hay prices reduced by $4.75 a ton to be comparable to loose hay prices previously quoted.

[2]All potash salts now quoted F.O.B. mines only: manure salts since June 1941, other carriers since June 1947.

****The weighted average of prices actually paid for potash is lower than the annual average because since 1926 over 90% of the potash used in agriculture has been contracted for during the discount period. Since 1937, the maximum discount has been 12%. Applied to muriate of potash, a price slightly above $.471 per unit K_2O thus more nearly approximates the annual average than do prices based on arithmetical averages of monthly quotations.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Fertilizer Recommendations for Arkansas," Ext. Serv., Univ. of Ark., Fayetteville, Ark., Cir. No. 467, Sept. 1949, C. F. Lund, W. R. Perkins, and E. J. Allen.

"Sales of Commercial Fertilizers and of Agricultural Minerals Reported to Date for Quarter Ended September 30, 1949," Bu. of Chem., State Dept. of Agr., Sacramento 14, Calif., FM-191, Nov. 15, 1949.

"Commercial Feeds—Annual Report 1948," State Dept. of Agr., Des Moines, Iowa, Bul. No. 63-F.

"Liming Hay and Pasture Land," Ext. Serv., Univ. of Maine, Orono, Maine, Sept. 22, 1949.

"Grades of Fertilizer and Fertilizer Materials as Acceptable for Registration and Sale in the State of Mississippi for the Year 1950," State Dept. of Agr. and Comm., Jackson 5, Miss., June 7, 1949.

"Lime Report for the Years 1945-1948," Pa. Dept. of Agr., Harrisburg, Pa., Gen. Bul. 626, Vol. 32, No. 5, Sept.-Oct. 1949.

"Inspection and Analysis of Commercial Fertilizers," Agr. Exp. Sta., Clemson Agr. College, Clemson, S. C., Bul. 379, Nov. 1949, B. D. Cloaninger.

"1949 Results of Fertilizer Demonstrations on Small Grain and Hay," Soils Dept., Univ. of Wis., Madison, Wis., C. J. Chapman.

"1949 Results of Plow-sole Fertilizer Demonstrations in Wisconsin," Soils Dept., College of Agr., Madison, Wis., C. J. Chapman.

"1949 Results of Boron Topdressing Demonstrations on Alfalfa," Soils Dept., Univ. of Wis., Madison, Wis., C. J. Chapman.

"Nitrogen Fertilizer for Permanent Pasture Proves Profitable," Soils Dept., College of Agr., Madison, Wis., C. J. Chapman.

Soils

"Mechanical Treatments on Wyoming Range Land," Agr. Exp. Sta., Univ. of Wyo., Laramie, Wyo., Issue No. 15, Sept. 1949, O. K. Barnes.

"Land Use Experience in Southern Great Plains," USDA, Washington, D. C., Cir. No. 820, Oct. 1949, H. H. Finnell.

"First Things First," Soil Conservation Service, U.S.D.A., Washington, D. C., PA-69, 1949, A. B. Foster.

"Soil Survey of Essex County," Exp. Farms Serv., Dominion Dept. of Agr., Guelph, Ont., Can., Rpt. No. 11 of the Ontario Soil Survey, Jan. 1949, N. R. Richards, A. G. Caldwell, and F. F. Morwick.

Crops

"Dooryard Citrus Plantings in Florida," Agr. Ext. Serv., Univ. of Fla., Jacksonville, Fla., Bul. 140, Aug. 1949, J. A. Granger.

"The Idajon Apple," Agr. Exp. Sta., Dept. of Hort., Univ. of Idaho, Moscow, Idaho, Cir. No. 114, June 1949, Leif Verner.

"Seed Production of Kentucky Bluegrass as Influenced by Insects, Fertilizers, and Sod Management," Agr. Exp. Sta., Univ. of Ky., Lexington, Ky., Bul. 535, June 1949, J. T. Spencer, H. H. Jewett, and E. N. Fergus.

"Practices, Costs, and Tuber Bruising in Digging Potatoes in Aroostook County, Maine," Agr. Exp. Sta., Univ. of Maine, Orono, Maine, Bul. 472, June 1949, W. E. Schrumpf.

"Corn Storage for '49," Ext. Serv., Univ. of Md., College Park, Md., Ext. Leaflet No. L7, Sept. 1949.

"Tung Culture in Southern Mississippi," (Revised), Agr. Exp. Sta., Miss. State College, State College, Miss., June 1949, Bul. 464, W. W. Kilby and G. F. Potter.

"Science Serves New Hampshire Agriculture," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Sta. Bul. 376, Dec. 1948, A. R. of the Director.

"Raspberry Growing; Culture, Diseases and Insects," Ext. Serv., Cornell Univ., Ithaca, N. Y., Ext. Bul. 719, May 1947, G. L. Slate, A. J. Braun, and F. G. Mundinger.

"Pecans—Planting and Culture," Agr. Ext. Serv., Univ. of N. C., Raleigh, N. C., Ext. Cir. No. 342, Aug. 1949, H. M. Covington.

"Wheat Growing in Ohio," Agr. Ext. Serv., Ohio State Univ., Columbus, Ohio, Bul. No. 81, Rev. June 1948, E. Jones and C. L. Lamb.

"Tobacco Plant Bed Preparation and Management," Agr. Ext. Serv., Ohio State Univ., Columbus, Ohio, Bul. No. 280, Rev. June 1948, D. R. Dodd, Paul Haag, and T. H. King.

"The Protein and Crude Carotenoid Content of Hybrid and Open-Pollinated Corn: A Summary," Agr. Exp. Sta., Okla. A & M College, Stillwater, Okla., Tech. Bul. No. 36, Nov.

1949, J. E. Webster, J. S. Brooks, and C. B. Cross.

"The Oklahoma Vegetable Research Station at Bixby, Oklahoma," Exp. Sta., Okla. A & M College, Stillwater, Okla., Mimeo. Cir. M-184, June 30, 1949.

"Kiamichi Experiment Station Field Day," Agr. Exp. Sta., Okla A & M College, Stillwater, Okla., Mimeo. Cir. M-185, July 15, 1949.

"Comparative Nutrient Analyses of Various Small-grain Crops and Annual Ryegrass as Used for Winter Pasture," Agr. Exp. Sta., Okla. A & M College, Stillwater, Okla., Mimeo. Cir. M-186, Aug. 1949, V. G. Heller and H. W. Staten.

"Growing Raspberries in Washington," Ext. Serv., State College of Wash., Pullman, Wash., Ext. Bul. No. 401, Sept. 1949, J. C. Snyder, D. H. Brannon, and M. R. Harris.

"Where American Agriculture is Coming of Age," Ext. Serv., Univ. of Wis., Madison, Wis., Cir. 385, July 1949, W. M. Landess and Forrest Turner.

"Tomorrow's Food," Agr. Conservation Programs Branch, Prod. and Mktg., Admin., U.S.D.A., Washington, D. C., PA-72, July 1949.

"Hawaiian Wonder, New Rust-resistant Pole Green Bean," Agr. Exp. Sta., Univ. of Hawaii, Honolulu, T. H., Cir. 28, Oct. 1949, W. A. Frazier and J. W. Hendrix.

"Fertilization of Pasture and Forage Crops," Agr. Ext. Serv., Univ. of Hawaii, Honolulu, T. H., Ext. Cir. 269, July 1949, H. M. Vollrath.

"Seventy-third Annual Report of the Ontario Agricultural College and Experimental Farm, 1948," Ontario Dept. of Agr., Ottawa, Ont., Can., 1949.

"Dominion Experimental Station, Swift Current, Sask.," Exp. Farms Serv., Canada Dept. of Agr., Ottawa, Ont., Can., P. R. 1937-1947, 1949.

Economics

"The 1950 Agricultural Conservation Program Handbook for: ACP-1950-Ark.; ACP-1950-Conn.; ACP-1950-Ill.; ACP-1950-Ind.; ACP-1950-Ky.; ACP-1950-La.; ACP-1950-Me.; ACP-1950-Minn.; ACP-1950-Mont.; ACP-1950-Nev.; ACP-1950-N.H.; ACP-1950-N.J.; ACP-1950-N.D.; ACP-1950-Okla.; ACP-1950-Pa.; ACP-1950-R.I.; ACP-1950-S.C.; ACP-1950-S.D.; ACP-1950-Tenn.; ACP-1950-Texas; ACP-1950-Va.; ACP-1950-Wis.," U.S.D.A., Washington, D. C.

"Factors that Give Value to Land or Basic Land Values," Agr. Exp. Sta., Univ. of Ariz., Tucson, Ariz., Bul. 223, July 1949, Karl Harris.

"1948 Agricultural Statistics for Arkansas," Crop Rptg. Serv., Bur. of Agr. Econ., U.S.D.A. with Agr. Exp. Sta., Univ. of Ark., Fayetteville, Ark., Rpt. Series No. 13, June 1949.

"Farm Management, 1948 Summary and Analysis by Type-of-Farming Area," Agr. Exp. Sta., Kansas State College, Manhattan, Kans., Agr. Econ. Rpt. No. 38.

"Methods and Principles of Farm Development," Agr. Exp. Sta., Univ. of Ky., Lexington, Ky., Bul. 531, May 1949, E. J. Nesius.

"North Carolina Agricultural Statistics, 1949," N. C. Crop Rptg. Serv., Raleigh, N. C., Graphic Issue, Number 91, Aug. 1949.

"Social Aspects of Farm Mechanization in Oklahoma," Agr. Exp. Sta., Okla. A & M College, Stillwater, Okla., Bul. No. B-339, Nov. 1949, R. T. McMillan.

"North Central South Dakota Farm Record Summary," Agr. Exp. Sta., S. Dak. State College, Brookings, S. Dak., 1948 Sixth A. R., Agr. Econ. Pamph. No. 27, May 1949.

"Farmer Cooperatives—A Guide for Youth," Agr. Ext. Serv., Va. Polytechnic Inst., Blacksburg, Va., Cir. 476, Feb. 1949, G. H. Ward.

"How Farmers Do Business through Cooperatives," Agr. Ext. Serv., Va. Polytechnic Inst., Blacksburg, Va., Cir. 477, Feb. 1949, G. H. Ward.

"Keeping Up on The Farm Outlook," Ext. Serv., State College of Wash., Pullman, Wash., Ext. Cir. No. 140, Oct. 31, 1949, Karl Hobson.

"Farm-mortgage Loans and Their Distribution by Lender Groups, 1940-48," Bu. of Agr. Econ., U.S.D.A., Wash., D. C., Cir. No. 814, Aug. 1949, H. T. Lingard.

"Agricultural Outlook Charts—1950," Bu. of Agr. Econ., U.S.D.A., Washington, D. C., Oct. 1949.

"A Graphic Summary of World Agriculture," Office of Foreign Agr. Relations, U.S.D.A., Washington, D. C., Misc. Publ. No. 705, Oct. 1949, R. G. Hainsworth.

"Citrus Fruits—Acreage, Production, Farm Disposition, Value and Utilization of Sales, Crop Seasons 1946-47 to 1948-49," Crop Rptg. Board, Bu. of Agr. Econ., U.S.D.A., Washington, D. C., Oct. 1949.

"Handbook on Major Regional Farm Supply Purchasing Cooperatives, 1947-48," Farm Credit Admin., U.S.D.A., Washington, D. C., Misc. Rpt. 134, Aug. 1949, J. G. Knapp and J. L. Scearce.

"Foreign Agricultural Trade—United States Foreign Trade in Agricultural Products by Commodity and by Country, Annual Fiscal Year, 1947-48 and 1948-49," Office of Foreign Agr. Relations, U.S.D.A., Washington, D. C., Dec. 1949.

"Annual Report of the Statistics Branch, 1948," Ontario Dept. of Agr., Toronto, Ont., Can., 1949.

"Why did Mahatma Gandhi leave college, Simon?"

"All of the girls wanted his pin."

Shake and shake the catsup bottle,
None will come and then a lot'll."

Determine Cause of Alfalfa Ills Then Apply Cure

BEFORE you can cure yellowing or dying of alfalfa you must first know the cause, University of Tennessee Agricultural Extension Service agronomists advise farmers.

Discoloration, often laid to weather conditions, may be caused by mineral deficiencies in the soil, or by fungus diseases. It is sometimes difficult to determine the cause without a soil test or a study of the plant for signs of disease.

In periods of dry weather, potash and boron are less available to the plants, which may cause deficiency symptoms if the soil is low in either or both of these minerals. Where it is known that soil has been amply supplied with potash it is likely that yellowing is caused by a boron shortage.

A boron deficiency causes yellowing of the upper leaves of the plant and the short innernodes at the upper end of the main stems. While boron is usually applied in February or March, it may be applied after the first alfalfa cutting at the rate of 15 to 20 pounds per acre. Soil tests should indicate the amount of potash to add.

Sometimes after prolonged damp and warm spring weather, purple rhizoctonia, a fungus disease, attacks alfalfa. In this case the stems turn purple or brown, and the entire plant dries up. Early cutting, grazing, and crop rotation are methods of control.

Erosion Experiments Show Need For Sod

THAT Pennsylvania farmers should use longer rotations, strip cropping, and contour planting is reflected in results of a 6-year series of experiments conducted at the Pennsylvania State College. These erosion studies show the need for longer rotations involving more hay and grass crops, and either strip cropping or contour planting for grain and cultivated crops.

Both water and soil losses were studied in the cooperative project of the Pennsylvania Agricultural Experiment Station and the Soil Conservation Service. Soil losses for corn were found to be most critical during August and September, after the corn has completed its growth and cultivation has ceased. This indicates need of adequate cover crops. With oats, most soil was lost in the first month of growth.

Water losses were found to be high during midsummer when corn, oats, and wheat are grown, but the peak is reached in March of every year. This peak is caused largely by melting snow and ice in late winter and early spring.

Rainfall during spring and summer months is greater than in fall and winter. Crops, therefore, do not suffer so much from lack of rainfall as from the inability of the soil to catch and hold moisture. This was attributed to the more intense rains during the summer and to unfavorable physical condition of the soil.

In addition to measuring soil and water losses over the 6-year period, the studies also included soil rebuilding, strip cropping with typical Pennsylvania crops, tillage analysis, and contour cultivation.—*A. H. Imhof, Pennsylvania Agricultural Experiment Station.*

Uncultivated Orchards

By David S. Clarke

Work Unit Conservationist, Alexandria, Kentucky

"I'D give up orcharding if it was necessary to cultivate them."

That's a strong statement to be said by the son of an orchardist who believed in working the ground under his fruit trees, but Albert Kenneweg did not give up orcharding and he does not cultivate the steep land on which his orchards grow.

Standing on one of the high points of his farm overlooking his acres of apples and peaches, weighted down with a bountiful crop, Albert Kenneweg pointed to a hillside of apple trees, "My father plowed that field one year," he said, "and the rains came and the soil was washed off as deep as he had plowed. He cultivated it and lost more soil. This process was repeated from year to year, until that orchard was abandoned to brush and locust. My father died, and for awhile my brother and I together ran this farm. Later, I took over the field operation and have been in full charge since 1938. As you can see, my orchards are uncultivated. The soil under the trees is held in place by grass."

It was true, under all the trees where I could see, there was grass, orchard grass, bluegrass, alsike, Kentucky fescue, lespedeza, and even some sweet clover, which Kenneweg said was volunteer. I had to look a long time to find even a small area as large as my hat, bare of a blanket of grass.

Seeing the soil wrapped and covered in the green sod, it was hard for me to believe the story Kenneweg told of the farm's past history. "On that hillside, when I took over the operations of the farm," he said, "the orchard was overgrown with brush. A man from somewhere farther South helped me clean out the brush and thin the fruit trees which were twice as thick as they are now. Then I seeded grasses and clovers, using manure and fertilizer to get the grass to grow. Over there," he added, pointing to a young orchard on a smooth green hillside, "were gullies deep enough to bury a horse in. I plowed the gullies in and smoothed it, still more, with a bulldozer."

Kenneweg convinced me when he directed my attention to a hillside, green with alfalfa and said, "Do you remember that field?" I remembered. In 1946, he had taken me over that field which was then rough, gullied, and brushy, producing neither pasture nor crops. Now there are no gullies, no brush, no wasteland. Only a few spots where the alfalfa is not as luxuriant as the rest indicate a few of the former galled, eroded, or gullied areas. "I'm treating those areas with organic matter, barnyard manure, and fertilizer. Soon they will be growing grass as tall as the rest of the field," Kenneweg told me. "A man named John Herpst, who died last summer when he was over 90 years old, told me he could remember when he helped scythe timothy growing shoulder high from that field. I have not gotten it back to that state of fertility yet, but it has improved a lot since I started working on it in 1946.

"I have one sore spot left on this farm, I'd like you to see," so we walked to the back end of the 126-acre farm. There, hidden by surrounding apple orchards, was an acre or so of eroded overgrown wasteland; a mass of six-foot deep gullies, gouged into the earth.

"One of my next projects," announced Kenneweg, "is to bulldoze the brush from this area and build a pond here to supply water to use in spraying. The area will be inclosed by a multiflora rose fence for a haven for quail and other wildlife. After I have this in shape where you can see, I want you to use your level to lay out this pond

like you did for the lake I built last year.

"John Herpst, the old man I mentioned to you, said this field was gullied as long as he could remember. He said that several times he helped fill them up but they formed again. This ground washes easily, that's why I plan to use it for a pond and protect it with vegetation which will hold the ground and furnish food for wildlife."

As we retraced our steps back through the orchards, Kenneweg revealed more reasons of his success in obtaining soil-holding grasses and bountiful fruit. "When I cleared and smoothed the alfalfa field," he said, "I saved the limestone rocks in it and had them crushed to spread on my fields. Each year I topdress parts of the orchard with 10-6-4 fertilizer which increases the fruit yield and furnishes some phosphate and potash to help the clover. The clover produces nitrogen cheaper than I can buy it, but not enough, so after the June drop, I topdress the peaches with additional nitrogen, with one or two pounds per tree. Sometimes I use as much as four pounds on thin areas. Where I fertilize early, the effect on the trees and fruit is noticeable the first year. I mow under the trees according to the need. This year I mowed twice, once before the fruit bent the limbs down in the path of the tractor. I leave what I mow on the ground to form a mulch which holds back the rainwater until it can soak into the ground. The grass and mulch cause more water to soak into the soil for the trees than the grass used, so by not cultivating my orchards I am saving not only soil but water also."

Having reached the farm buildings, Mr. Kenneweg exhibited his tractors and other machine-operated tools. "There isn't a horse on the place," he announced. "I do all my work with machinery." He proudly showed off his herd of high-grade Guernseys which he built up from a common herd by the use of good sires.

Then we went into his home, equipped with modern labor-saving devices, and met his family. His mother was using a new electric washing machine. His wife was putting the youngest of their three children to bed for an afternoon nap.

"There is another advantage of using grass in my orchards instead of cultivating them," said the pleased Kenneweg, looking at his youngest child. "Cultivating and plowing take a lot of time and I have no one to help me. The oldest of my two sons has not started to school. It will be a long time before they can help with the farm work, but even with their help, I'll give up orcharding on these steep hills if it becomes necessary to cultivate them."

Wheat Improvement in Southwestern Indiana

(*From page* 12)

than 140,000 bushels. At $2 per bushel this program netted farmers over $200,000 in cash and helped them gain experience and "know-how" for the future. Several carloads of other forms of nitrogen material were secured and applied. Producers report that early applications, about March 1, gave best results. The nitrogen was applied with grain drill, hand seeder, and fertilizer spreader, and by airplane. The cost of applying the material by "air express" was not out of line with the cost of other methods. Early applications of both nitrogen and legume seed by plane when fields were too wet and soggy for tractor and grain drill application more than paid, through increased yields, for the entire cost.

Agricultural research coupled with farm "know-how," plus better yielding wheats, disease-free and winter hardy, and possessing short stiff straw and satisfactory milling qualities, are bound

to increase the average annual yield in the Pocket Area. With the help of 320 local committeemen, county agents, elevator operators, and plant scientists from Purdue University, the wheat improvement program will be effective, not only in increasing yields but also in improving soil conditions so that farm folks will have a happier and more satisfied life. Better homes are being built and more sons and daughters are getting a better education through "Vigo fellowships." In the next decade producers hope to raise the average annual yield of wheat from 17.4 bushels to 25 bushels per acre. Increased yields per acre put more profit dollars in the pockets of farm folks. Larger profits per acre mean more farm purchasing power and a better commonwealth.

Simplified Field Test for Determining Potassium

(*From page* 26)

is over 2,000 ppm the plants are growing on soil which probably has sufficient exchangeable potassium for normal growth. When the potassium concentration in the expressed sap falls to, or below, 1,000 ppm the plants will be showing definite potash-deficiency symptoms. Preliminary work with tomatoes has indicated that some response to potash fertilizer may be expected even though the expressed sap contains 2,000 ppm of potassium.

Preparation of Reagents

The reagents required for the preparation of the test papers are prepared as follows:

Solution A

Weigh 0.60 grams of dipicrylamine and 0.60 grams of Na_2CO_3 into a 100-ml. beaker. Add 15 to 17 ml. of distilled water, stir, and bring to a boil. Then cool and filter using a small (7 cm.) filter paper. Wash the residue on the filter paper with distilled water and make the volume up to 25 ml. (For convenience, filter and wash directly into a 25-ml. graduate.) This reagent, when used as a spot on a filter paper, is sensitive to concentrations of about 1,000 ppm (or more) of potassium in solution, but not to concentrations of less than 750 ppm.

Solution B

Transfer 8 ml. of *Solution A* into a 25-ml. graduate and dilute to 25 ml. with distilled water. This reagent, when used as a spot on a filter paper, is sensitive to concentrations of about 2,000 ppm (or more) of potassium in solution.

Solution C

Transfer 10 ml. of the *Solution B* into a 25-ml. graduate and dilute to 15 ml. with distilled water. This reagent, when used as a spot on a filter paper, is sensitive to concentrations of about 3,000 ppm (or more) of potassium in solution.

Preparation of the Test Papers

Cut Whatman No. 1 filter paper into strips approximately one-half inch wide and three inches long. At one extreme end place a small drop of *Solution A* on the filter paper to form a test spot. Then about one-half inch above this spot, place a small drop of *Solution B* on the filter paper strip. Finally, about one-half inch above the second spot place a small drop of *Solution C* on the filter paper strip. Allow the papers to dry, or place them in a drying oven for

three to five minutes at 85° C. for drying. When dry the test spots should vary in color from a deep orange color for the first (Solution A) spot to a light orange color for the last (Solution C) spot. Once the spots or papers are dry they may be stored for future use. Although prepared papers have been kept and found usable after two years, the reagent ages and becomes sluggish in action with time. To insure good results it is not recommended that prepared papers be kept for more than a year. Figure 1 illustrates the general appearance of the prepared test papers.

Performing the Test

For corn, place the test paper along the midrib of the corn leaf. Using a pair of pliers, place one of the jaws on the test spot and the other underneath the midrib and gently squeeze until the plant sap moistens the test-spot area. This procedure is repeated on the same leaf and midrib for each of the three test-spot areas on the test paper. Allow the sap to react with the test paper for about 30 seconds, then dip the test paper into a vial of approximately 0.5 normal HCl solution for about 30 seconds. The test is positive if a reddish-orange or brownish color persists on the test-spot area. The test is negative if the spot turns a lemon-yellow color. Since the blanks or negative readings differ slightly in their depth of yellow color, an unused test paper should be dipped into the acid to get a true color of the blank. Finer readings may be secured by noting the relative intensity of the color developed in positive tests.

Interpretations

Preliminary work with corn indicates that if the plant sap contains over 3,000 ppm of potassium, i.e., when all three spots are positive, the soil is supplying plenty of potassium to the plant. If the center (2,000 ppm) spot is positive but the last (3,000 ppm) spot is negative, the plant is probably getting enough potassium from the soil. If the first (1,000 ppm) spot is positive but the other two are negative, the corn plant is probably growing on a soil that would have responded to potassium treatment. If all three spots are negative the plant will be showing definite potash-deficiency symptoms. This type of calibration may be illustrated by the data in Table I. These preliminary results were obtained during the 1949 season on the Toledo and Newton experimental fields which are extremely potash-deficient fields.

In reading the test it should be kept in mind that the test was developed to give a definite reading at the concentrations indicated. Therefore, as the concentration of potassium in solution approaches the indicated levels, smudges or weak tests will be obtained. These weak tests permit a somewhat greater range in interpretation of the test since a weak test indicates smaller amounts than actually needed for a positive test. Similarly, a good strong test indicates the presence of somewhat greater concentrations of potassium than actually needed for a positive test.

For comparative work, the same general portion of the plant must be sampled each time. Measurable differences in potassium concentrations in the plant sap may be found from top to bottom of the plant. This is especially true for soybeans, where the lower leaves have a higher potassium content than do the upper leaves. In the preliminary work on corn, the leaf at ear level was always tested, while for soybeans the enlarged base of the petiole on a leaf from the top of the plant was used for testing. For legumes the enlarged base from upper leaves was used.

General Discussion

In presenting this field plant-tissue test for potassium no claim is being made for the accuracy of the critical levels of potassium required in the plant sap for normal growth. The work so far is definitely of a preliminary nature and is subject to such changes as further data may dictate. However, indications

are that the critical levels indicated are somewhat within the proper range, and that the tests can be used successfully to confirm indefinite potassium plant-deficiency symptoms, or to exclude the possibility of such deficiencies.

It should also be pointed out that test papers can be prepared to suit specialized conditions. The sensitivity of the test spots can be increased or decreased by increasing or decreasing the concentration of the reagents used to prepare the test spots. Similarly, the range or spread between the test spots can easily be altered by controlling the concentrations of the reagents used.

With succulent plants high in chlorophyl the green color of the expressed sap may shadow or mask the color of the test. This difficulty may be overcome to some extent by using a wider strip of filter paper folded lengthwise. The test spots are then placed on one-half of the strip of paper, and when the paper is used for testing, the untreated half is used as a filter to absorb the leaf color as the sap is squeezed through it on to the test-spot area. Such a technique is necessary when working with green grass leaves or leaves that have short petioles. Under some conditions the testing of the actual stem may be necessary.

Caution is advised in making, or trying to make, fertilizer recommendations on the basis of this test. It is felt that

TABLE I. DATA FOR A PRELIMINARY CORRELATION BETWEEN TISSUE-TEST VALUES FOR POTASSIUM AND RESPONSE TO SOIL TREATMENT AND SOIL TESTS

TOLEDO FIELD

Treatment	K Soil Test Lb/A	Corn				Soybeans			
		Yield* Bu./A.	Paper Test**			Yield Bu./A.	Paper Test		
			1,000	2,000	3,000		1,000	2,000	3,000
Check	40–	13	+	0	0	14	++	0	0
Manure	110	41				19	+++	+	0
Residues, Lime, Rock phosphate	40–	24	+	0	0	14	++	0	0
Residues, Lime, R. phos., Potash	100	62	+++	+	0	23	+++	++	0
Residues, Lime, R. phos., Potash, Potash	260	69	+++	+++	++	30	+++	+++	+

NEWTON FIELD

Check	60	11	++	0	0	9	+++	+	0
Manure	150	26	+++	0	0	16			
Residues, Lime, Rock phosphate	50	39	++	0	0	15	+++	++	0
Residues, Lime, R. phos., Potash	160	54	+++	++	0	20	+++	+++	+
Residues, Lime, R. phos., Potash, Potash	250	57	+++	+++	+	20	+++	+++	++

* Average yields 1945-1948

** 0 = Blank or negative test
\+ = Slight test
++ = Fair test
+++ = Good or positive test

the test is not sensitive enough for reliable fertilizer recommendations. It does indicate and separate the extremes in potassium levels, but it does not indicate, and is not intended to indicate, small differences in the potassium levels in the soil. It is suggested that the test be used on several plants in any given area and a representative reading secured. If it is found that the majority of the plants are indicating a low level of potassium, a soil sample should be collected and tested. The soil-test values can then be used for an accurate fertilizer recommendation.

References

1. Feigl, F. 1943. Laboratory Manual of Spot Tests. Academic Press. Pages 114-117.

More Fish and Game

(*From page* 25)

come the common deficiencies of natural climate, plant growth, and soil. The management of wildlife land and pond waters is an exact parallel. Our experience with failures and successes on the widest range of conditions is such that we can tell landowners how to make failures or successes of their efforts.

Failures come from two major causes:

First, unsound site selection—too much water or silt or both in ponds; land too wet or subject to grazing in the case of bicolor plantings.

Second, failure to fertilize the clear waters of ponds sufficiently; and failure to feed bicolor with the phosphate and potash which a vigorous growth requires to produce a heavy crop of seed.

Poor selection of sites can be avoided by making a complete farm plan through the facilities of soil conservation districts. They have the conservation survey maps and watershed surveys to determine the land's ability for production and safe management. Every district has a trained technician supplied by the Soil Conservation Service

Fig. 4. Wildlife production is often attained on old, eroded field borders, but may be considered also on any semi-idle lands.

to counsel with the landowners on these technical matters so vital to safe and sure production. That Soil Conservation Service technician is the "man of experience" in wise land use and the way to conserve land and the waters that fall upon it.

Disappointing failures — delayed yields—are equally unnecessary. A man should not plant bicolor or any kind of bird food unless he intends to give it the fertilizer to produce a good crop of seed. We have seen hundreds of plantings where fertility has been allowed to run down too much. Seed produced was too little to feed a covey of 12 or 15 birds twice a day, and the birds moved off as one would expect them to do.

Good ponds, properly stocked, have "gone to pot" just as readily when owners failed to understand the fertility requirements of high production. The first warning is given by clear water. If a bright tin object held 12 inches beneath the surface can be seen, there is need to fertilize the pond. If the water is not fertilized, the next symptom—water weeds such as coon tail beginning to grow under the surface from the bottom—will be observed. Fertile waters become dark enough to shade out submerged weeds. Infertile waters support relatively few pounds of fish and allow weeds to grow. The weeds protect little fish from the big ones until too many pounds of fish are smaller than usable size, too few are large enough to take home. Fishing isn't worth the effort under these conditions. The waters are unused, unproductive, unprofitable.

The new use of multiflora rose—incidentally, another in the science of modern land-management practices contributed by Soil Conservation Service "wildlife technicians"—has an indirect influence on farm game foods. The rose is used simply as a permanent "living-fence." It has direct value as cover but almost none as food for our resident wildlife. But it is an absolute necessity on livestock farms before you can protect wildlife foods from grazing, plowing, and mowing. Here we use a cover plant of high quality to protect food and grass cover alongside, reaching the goal to grow plenty of food and cover on a small amount of land devoted to wildlife production. More farm game can be grown with these at-

Fig. 5. The "living-fence" of multiflora rose designs the livestock farm to protect game food and cover.

tractive, dependable, growing-fences. This rose, incidentally, will not become a pest. We have grown it on farms in the South for 14 years, and have found beyond question that we can live with it happily.

In addition to the influence of farmer districts, Soil Conservation Service, and Extension Service, the State Game and Fish Divisions have very great opportunities to work on farm game developments. Federal aid funds appropriated to the states are being used and should be used in greater amounts to supply cooperating farmers with seed and plants of bicolor and multiflora rose. Similar aid is needed for fish management—removing rough fish and weed growth from farm ponds. The soil conservation districts need help from these sources and, happily, they are getting some, though not enough.

We need our sportsmen's clubs, game laws, and education nonetheless because of this new approach to wildlife restoration. We are simply adding an essential effort which has been lacking, an effort which would have prevented much loss of game and fish had it been employed earlier. But it is not too late. Game and fish will multiply readily, as fast as each pond and wildlife land-area is managed adequately and consistently for their support.

More than 25 million Americans can enjoy greater hunting and fishing than is available to them today. But they will have to encourage and support its production on the farms and ranches where they expect to find the fish and game. Otherwise less and less can be expected as we grow more livestock, build more highways, and expand our cities and industries. Restoration is the combined effort of good conservation and high production.

More Corn from Fewer Acres

(*From page* 16)

D. Advice in weed control:

Cultivate Properly

Any list of the enemies of corn should have *the man with the cultivator* at the head of the list. Cultivation, properly done, is a necessity to corn raising. Cultivation, improperly done, is one of the chief causes of reduced yields of corn.

The main purpose for cultivating is to control weeds, and cultivating should be done only as often as necessary to accomplish this. Use of the spike harrow or weeder while corn is too small to cultivate may save several cultivations later on and give better weed control throughout the season. Plant a little heavier if you intend to use a harrow. You will destroy some plants.

The first cultivation should be the

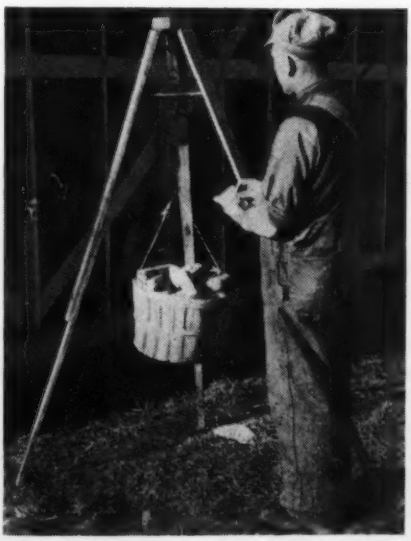


Fig. 3. The first step in adjusting the corn planting rate to the fertility of a farm is to calculate the average ear weight.

Fig. 4. The worst "enemy" of corn under present growing practices is man with power tillage tools. "Go slow" cannot be over-emphasized.

closest to the corn since that is the time when the feeder roots are not too long and are less likely to be cut off by the cultivator. If you use a tractor cultivator—go slow. Every stalk you tear out or cover up is another ear of corn lost.

The cultivator should be equipped with wide sweeps that do not penetrate deeply, but cut off the weeds very effectively just under the surface. Narrow shovels penetrate too deeply and cut off feeder roots of the corn. They also dodge around a lot of weeds and get only those on which they score a "direct hit."

Fig. 5. Vo-ag and veteran trainees watched their corn crops for signs of nutrient deficiency and disease.

Fertilizer Trends in South Carolina

(*From page* 19)

A meeting of all fertilizer manufacturers, dealers, and salesmen in South Carolina is held each year either at the Clemson Agricultural College or at one of the five branch experiment stations. Other than getting better acquainted, which helps solve problems of mutual interest, all in attendance are able to see at first hand plant-food deficiency symptoms, experiments with varying amount of different fertilizers, and experiments and demonstrations with all types of machinery for properly applying fertilizers. The groups are also interested in the general experiment station program, such as experiments with varieties, spacing of plants, plant breeding for disease resistance, and other features. The 732 fertilizer dealers, 96 fertilizer manufacturers located in the State, and 70 other fertilizer manufacturers located in 14 states who sell in South Carolina, along with the numerous salesmen, play an important role in molding the 42 million dollar fertilizer program in South Carolina.

TABLE IV. TOTAL ANNUAL FERTILIZER TONNAGE USED IN SOUTH CAROLINA FOR THE PERIODS SHOWN.

Years	Tons
1891–1892	213,143
1893–1894	200,996
1898–1899	261,977
1903–1904	395,638
1908–1909	688,939
1913–1914	961,794
1918–1919	1,028,597
1923–1924	693,040
1928–1929	793,337
1933–1934	547,460
1938–1939	666,853
1943–1944	802,579
1948–1949	998,512

The Old Century

(*From page* 5)

science given to 159 persons in 20 countries. Germany with 38, our country with 29 awards, Great Britain with 28, and France with 16 winners are among the leaders in the world's march to fundamental accomplishments.

Although they began their first work in the 1890's, the great magical names of Edison, Steinmetz, and DeForest shine just as brightly as any who have graced the galaxy of the Nobel lists representing the United States. And now those remote farm homes that we knew so well and think of so yearningly are able to have the good things of life, thanks to these marvelous mentalities, plus the equally effective science of mass distribution.

Agriculture also has partaken of the glories and the progress marking the Twentieth century. Just before it dawned we revered the past successes of such men as Edmund Ruffin in soil chemistry, John Deere and Cyrus McCormick in farm mechanics, Justin S. Morrill in education, S. M. Babcock in dairy science, Theobald Smith in eradication of cattle fever, and Harvey Wiley, the astute chemist and food crusader.

At the turn of the century men discovered the pure-line theory of breeding plants and rediscovered the forgotten Mendel law of heredity. This hastened the work of cereal improvement by selection to fix desirable characters.

Rapidly there came to the fore many brilliant plant breeders to unshackle the farmer from low yields and poverty. The list includes H. F. Roberts of Kansas, C. E. Saunders of Canada, W. J. Spillman, pioneer in wheat hybridization, H. K. Hayes of Minnesota, E. S. McFadden of Texas, Cyril G. Hopkins of Illinois, and turning to corn alone—more master minds. These included G. H. Shull of Carnegie Institution, E. M. East of Illinois and Connecticut, A. D. Shamel of the U. S. Department of Agriculture, and many more.

IT was back in 1917 that the first commercial hybrid corn that involved inbred lines appeared—a Burr-Leaming double cross, perfected at Connecticut Station. Then the next commercial hybrid to be produced and sold commercially was a cross between an inbred Leaming line from Connecticut and an inbred selection from the Bloody Butcher variety, known as Copper Cross. It was distributed by Henry A. Wallace of Iowa in 1924. Today open-pollinated corn and the old-fashioned methods of curing ears for planting are gone for good. Instead we have over 90 per cent of the crop in a majority of the largest corn states planted only in select hybrid seed. That this and the advent of the sturdy resistant wheats seem to have produced a headache in disposal of a frequent so-called surplus is a story that challenges us to take the next vital step. That step is in the realm of social and economic discovery—to find a foolproof way to live with and enjoy overwhelming abundance.

Even now men are arguing about that goal and how to get there. Each proponent of a plan is sure his is the real road to the Utopia of profitable plenty. But when it comes, he who discovers it and makes it work without subsidizing farmers and "pauperizing" consumers is bound to have a permanent niche carved out for him in the annals of agriculture.

Where is the wealthy concern or organized association that will now come forward and offer some tempting plum to a person or a group of people who can work out such a desirable achievement? It offers just as good a field for further encouragement to ambitious brains as the Nobel prize itself. I am sure that you who are left to celebrate the advent of the year 2000 will be able to name the one who finally found a practical plan to take the risk out of growing more and better crops and livestock so that two-thirds of the world's population need not go hungry in an era of multiplied production power.

It would be a lasting disgrace if all our potent plant and animal breeders and our scientific soil chemists and pesticide compounders find themselves frustrated and their efforts brought to a stalemate because of some economic laws and barriers. Where would we find again such men as M. A. Carleton of the Federal research staff, H. L. Bolley of resistant flax fame, or Sewell Wright and his coefficient of livestock breeding?

IN a similar way when it comes to choosing better diets and living on better balanced foods, we are often cornered and browbeaten by silly economic philosophies of long standing that have never been exploded. In this field we take pride in the work in vitamins of McCollum and Steenbock, Sherman and others—and yet it sounds foolish to ask everyone everywhere on all levels of income to abandon narrow menus and eat more fresh fruits and vegetables, dairy products and red meats, in search of abundant vitamins for young and old to prolong life and make it happier while it lasts. No, instead of nurturing the underfed and providing milk, cheese, and eggs for disadvantaged children, we rush to Washington for some support price project that puts the government into the storage and holding business and lifts the vitamins out of the reach of the jobless and the destitute. We do that because we haven't yet discovered the

thing which we shall know and use smoothly and fairly before the turn of the next century rolls around. Our sense of justice and our thrift will force us into what will prove to be the biggest milestone of any in the present century—making abundance a boon to everybody.

LIKEWISE the soil has been the object of countless heroic and determined lives in this century. We have had men like Curtis F. Marbut, father of the pedacals and pedalfers, and who was right at home with the Russian men of science, learning from them and adapting what they had found to what he sought for a better system of farming based on the right tillage and fertilization. We have had soil-test discoverers also whose work did much to hasten the application of the right plant food to the soils needing it most. These men, like Truog of Wisconsin, Spurway of Michigan, Hoffer of Indiana, Morgan of Connecticut, Thornton of Indiana, and Bray of Illinois contributed much to this astounding period of enhanced food output, the like of which no century before this one has ever beheld—and will not behold again if we fail to get true satisfaction out of plenty.

I haven't the time to hunt through the files of the good old BAE to get the exact figures with which to make you bug-eyed about how much more one good farm hand can jerk up out of the earth compared to his granddaddy before him—provided he doesn't keep union hours or get discouraged over bumper crops and what often happens to them. Yet I really do have a few digits around handy to wind up this essay with, if you can take it like a man.

In short, what I can prove easily is that one of the queer farm situations that have arisen since 1900 is simply less folks making a living on the farm, but with a larger percentage of the total national land area of about 1.9 billion acres fenced off into farms and ranches than we started out with 50 years ago. That is, we have a wonderful production of farm goods per man engaged in agriculture and a larger total farm area in relation to the entire land area than before.

Just 100 years ago I presume U. S. farmers were proud of the fact that the census takers figured that we had 1,500,000 separate farms, occupying 15.6 per cent of the total national land area. The land and buildings had a going value then of about $3.2 billions.

Then coming to 1900, we are said to have had then about 5,740, farms, occupying 839 million acres, or about 44 per cent of the national land area. In that year our fathers and grandfathers harvested crops on 283 million acres and the value of land and buildings they possessed or rented was $16 billions. The farm population at the turn of the century was somewhere close to 35 million souls, against a national population of about 80 million.

At the latest official tally in 1945 the reported number of farms was 5,800,000, consisting of 1,142,000,000 acres, or 60 per cent of the total land area, and the harvest was taken from about 352 million acres. But the farm residents numbered only about 28 million, more or less, being just through with a big war, against a background of something like 145 million persons.

YOU and I know the tiptop job we did during the war in feeding domestic consumers and serving thousands overseas with the best the world afforded. Sure, they got paid for it, but meanwhile there was something missing in the soil and some pretty thin hides left on the older operators too.

So it hasn't all been rosy and one-sided in this game of feeding more people with the work of fewer trained farmers. But the record is there for all to read and be proud to acclaim. Let's hope and pray that those who round out the last of this potent century of achievement and bereavement will have their destiny in better control than we did and peace for all time to come.

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The Plant Speaks Thru Tissue Tests (Sound, running time 14 min. on 400-ft. reel.)
The Plant Speaks Thru Leaf Analysis (Sound, running time 18 min. on 800-ft. reel.)
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Requests should be made *well in advance* and should include information as to group before which the film is to be shown, date of exhibition (alternative dates if possible), and period of loan.

Request bookings from your nearest distributor.

Three small boys were seated on the curb. One was playing with an airplane. One was playing with a fire engine. The other one was reading "Esquire."

A kindly old man approached and asked them what they wanted to be when they grew up. The first replied that he wanted to be a pilot on a B-29. The second wanted to be a fireman. The third looked up from his magazine and said, "Aw, I just want to grow up."

* * *

"Now, John," said the Judge, "tell us why you insulted this lady."

"Well, y'r Honor, I picked this lady up in me cab and took her to where she wanted to go, an' when she got out she gave me the exact change and no more, an' I sez under my breath: 'You stingy ol' hen,' and she heard me."

"Perhaps, John, you can tell us just what is your idea of a lady."

"Well, y'r Honor, I picked up a lady the other day an' took her to her destination, an' she gave me a five dollar bill, an' me bein' an honest man I reaches fur me change, but she sez: 'Aw, t'hell with the change, go buy yourself a shot o' gin.' Now, that's what I considers a lady."

* * *

A woman complained to an elderly man, who every evening walked his dog by her house, because the pup always paused by her new shrubs.

"I wouldn't worry," he said. "I always start around the block the long way, and by the time he reaches your bushes, it's only a gesture."

The conductor was perplexed. "Who on earth," he sputtered, "would want to steal a Pullman ladder?"

Just then, the curtains parted and a little old lady poked her head through cautiously. "Porter," she whispered, "you may use mine if you like. I won't need it until morning."

* * *

"I've made up my mind to go to Florida next winter so as to avoid the expense of fuel."

"Don't do it. The prices they charge for summer heat down there make our coal dealers seem like philanthropists."

* * *

A practical bridegroom was Sandy MacHughes.

He spent the first night trying on the old shoes.

* * *

In a restaurant, an elderly man had made several attempts to flirt with the pretty young waitress who was serving him. Finally, when she brought his dessert, he grew a little more bold. "My dear," he purred, "where have you been all my life?"

"Well," answered the girl quickly, "for the first forty years anyway, I probably wasn't born."

* * *

"I had to change my seat several times at the movies."

"Gracious, did a man get fresh?"

"Well, finally."

* * *

"Should a man propose to a girl on his knees?"

"Either that or she should get off."

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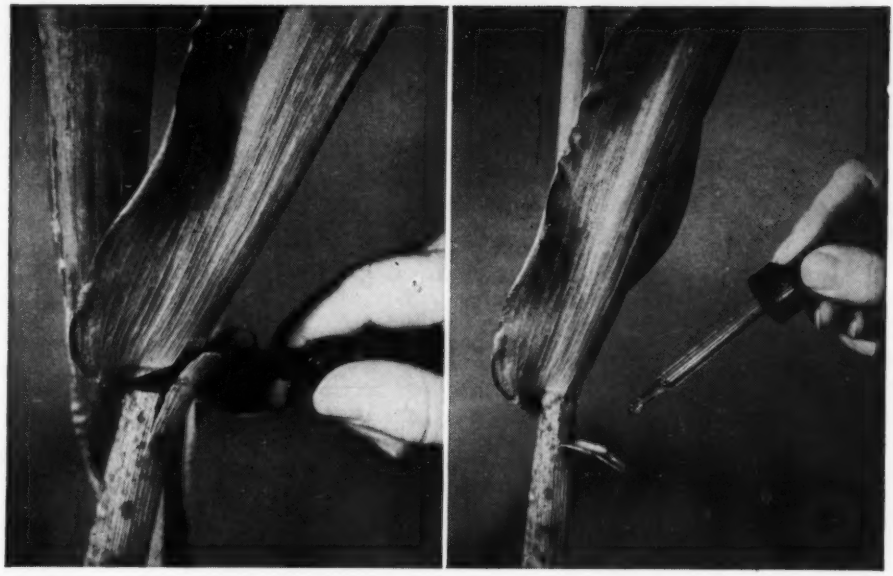

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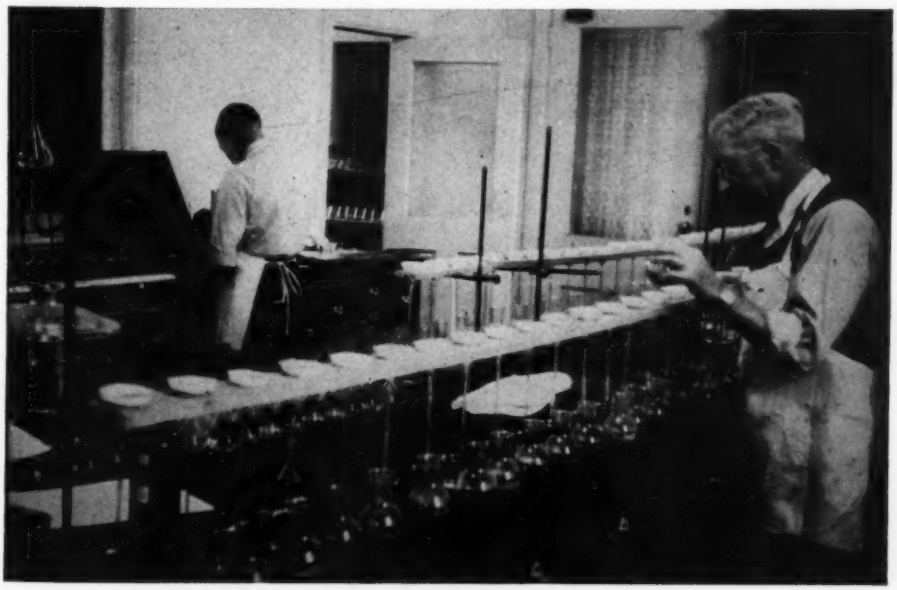

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